THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XVIII. No. 441—21st YEAR.] LONDON, SEPTEMBER 14, 1869. [Subscription per Ann. 15s. in Advance 18s. Credit. DOUBLE No. Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—
10,000 cubic feet of gas per ton of coal.
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13½ cwt. coke per ton of coal.
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These Meters are warranted to measure correctly and not to vary, and have come into general use more rapidly than any Meters hitherto manufactured.

PARIS EXHIBITION, 1867.
THE TESTING-HOUSE REPORTS.
The Reports prepared for the Science and Art Department, under the direction of the Lords of the Council, detail the arrangements made for testing the gas apparatus exhibited. In the testing-house erected by the Special Committee appointed to further this object a gasholder was constructed by Mr. G. Glover, being a *fac simile* of that produced and patented by him in 1860, and deposited in the Exchequer, under the provisions of the Sales of Gas Act, and British manufacturers of gas apparatus were invited by advertisement, and by direct application, to forward worthy objects for exhibition. Mr. G. Glover was, however, the only manufacturer who sent Meters to be tested. The report states that, as "Mr. Glover is a manufacturer of Dry Meters only, no opportunity presented itself of comparing their accuracy with that of Wet Meters under various circumstances, but the perfection to which that maker has brought his Meters prevents the possibility of those extravagant errors which are well known to exist where Wet Meters are used."
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J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay are promptly executed at their Works as above.
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and 69, UPPER THAMES STREET, LONDON,
Original Manufacturers of Wrought-Iron Gas Tubes and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.
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The Proprietors will, in future, use their own forms of bills of lading, and also issue certificates of origin, signed, as the case may be, either by JAMES FERGUSON & Co., or by the NITSHILL & LESMAHAGO COAL COMPANY; and they request all consumers purchasing Lesmahago Coal to demand such a certificate for each cargo, and to observe that it corresponds with the bill of lading.
Auchinheath, Lesmahago, March, 1868.

GEORGE GLOVER & CO.,
Patentees of the Standard Gasometers for the Government,
TWO MEDALS,

LONDON, 1862.
HAVE OBTAINED THE
HIGHEST
PRIZE
FOR
SILVER MEDAL,

PARIS, 1867.
IMPROVED DRY GAS-METERS AND GASOMETERS,
AT THE
PARIS EXHIBITION.
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AND 127, BOULEVARD DE MAGENTA, PARIS.

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SILVER MEDAL, PARIS EXHIBITION, 1867.

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WITH CHAMBERS FOR MOUTHS,

REQUIRING NO LUTING.

Gas Engineers are solicited to examine into the merits of this invention before erecting new or altering old retort-houses. It may be seen in action at the Alliance Gas Company's Works, Dublin, where its utility and economy will be clearly demonstrated. Although the saving in labour will be considerable, and quickly return any outlay of capital, there are other and important features strongly recommending its adoption at all gas-works, and which a gas engineer upon examination will at once appreciate.

The Directors of the Alliance Gas Company have kindly consented to give every facility to gentlemen desirous of seeing the invention in operation. Parties, therefore, about to visit Dublin will be so good as to send us their card, and we will furnish them with letters of introduction.

Drawings, &c., may be seen at our Office, and all details explained.

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1862.

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CLASS II.

This Paint having been in general use over seven years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

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MANUFACTURERS OF

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Of the Best Material and Workmanship, carefully adjusted to the requirements of the British Sales of Gas Act and Foreign Standards of Measures.

PATENT COMPENSATING GAS-METERS,

Which are uniform with the Ordinary Meters, and register with minute accuracy.

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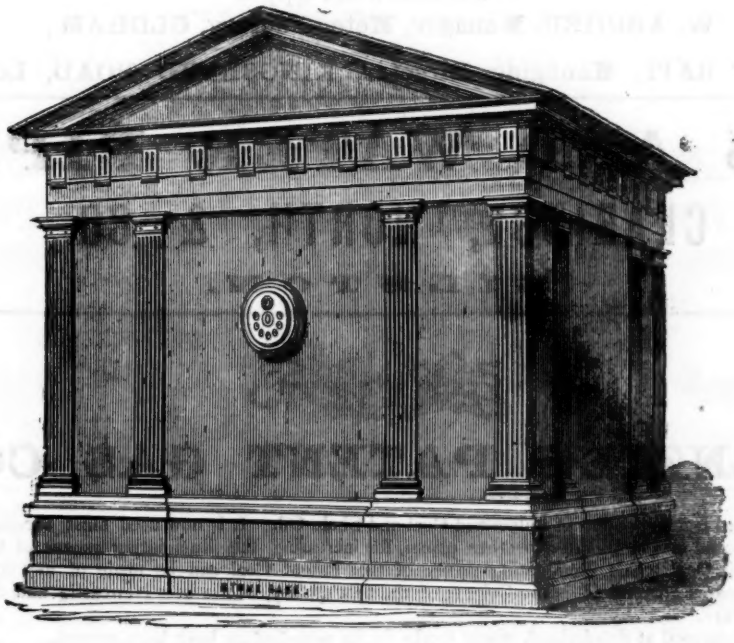
IN BEST TINNED IRON CASES.



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Home and Foreign Orders promptly attended to. Terms, &c., on application.

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Tender their grateful acknowledgments for the past generous and extensive patronage conferred on their firm, and beg to assure their Friends, Gas Engineers, and Gas Companies generally, that every exertion will continue to be made to maintain the sterling quality of their work in every department.

Their ORDINARY METERS, WET and DRY, have now a demand over that of any other maker in the North of England; and their STATION-METERS stand unrivalled for Design, Sound Workmanship, and Efficiency.

All sizes of CONSUMERS METERS generally in Stock.

STATION-METERS, in round or square cases, on the Shortest Notice.

GEORGE NEWTON,

(Late Senior Partner of the Globe Meter-Works,)

UNION STREET WEST, OLDHAM,

MANUFACTURER OF

IMPROVED WET & DRY CONSUMERS GAS-METERS,

GAS STATION-METERS,

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STREET GOVERNORS, PRESSURE and EXHAUST REGISTERS, TEST GASHOLDERS,

AND EXPERIMENTAL GAS APPARATUS GENERALLY.

For information, &c., apply to

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GEORGE RAIT, Managing Director, KINGSLAND ROAD, LONDON.

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M'KENZIE'S PATENT GAS COAL.

This Patent Gas Coal is a compound of Pulverized Coal and Shale Oil. It is now used most successfully by some of the London Gas Companies, and also in Dublin and other places, for increasing the illuminating power of the Gas, which it does at less cost than Cannel Coal. The illuminating power of this Patent Coal can be made of any strength required up to 35 candles, and is in all cases guaranteed. The Coke is of the best quality, as the best Newcastle and Sunderland Coals only are used in the manufacture.

This Patent Coal is shipped at Sunderland, where works for its manufacture have been erected.

Further particulars can be obtained from

W. W. JOBSON, 16, Fish Street Hill, LONDON; or

WALKER, BRUCE, & CO., Patent Gas-Coal Works, South Docks, SUNDERLAND.

EXTRACT *from the Inaugural Address of* THOMAS G. BARLOW, Esq., C.E., *President of the British Association of Gas Managers, at their Fifth Annual General Meeting, held in London on the 2nd of June,* 1868.

Gentlemen,—In considering the progress that has been made in the manufacture and distribution of Gas during the past year, the new inventions and new processes which have been adopted or tried with prospect of success, deserve to be specially noticed. Foremost among them is M'Kenzie's process for producing Gas of high illuminating power from small Coal, mixed with crude Shale Oil. The pressure which the Legislature has recently put on Gas Companies to raise the standard of illuminating power considerably above that obtainable from common Coal, has compelled most of them to use a certain proportion of Cannel Coal, at a heavy loss, and with a diminution in the value of the Coke. The advance in the price of Cannel Coal, consequent on the increased consumption, has stimulated inquiry to find a substitute for it; and this seems to have been accomplished by Mr. M'Kenzie, whose process has been successfully adopted on a large scale at the Alliance Gas-Works in Dublin. The small Coal is well mixed with the Oil, in the proportions varying from 10 to 30 gallons of Oil to one ton of Coals. This is effected by means of a mixing or grinding mill. The Compound material is then distilled in ordinary Gas Retorts of clay or iron, at a strong heat. I have recently witnessed an experiment on a mixture of Llantwit Small Coal shipped at Cardiff, and costing in Dublin 12s. 6d. per ton, with 5 per cent. of Broxburne Shale Oil, costing £5 10s. per ton, the produce of the distillation of one ton of which mixture was—

9750 cubic feet of Gas, 21·5 Candles illuminating power.
37 bushels of good hard, saleable Coke.
2 bushels of Breeze.
11 gallons of Tar.
15 gallons of Ammoniacal Liquor, of 5° Twaddle.

The cost of this mixture, including Royalty, was about 17s. per ton, against 24s. for Wigan Cannel, over which it has the advantage of at least 5s. per ton in the value of the Coke.

HENRY F. WILLEY,

GAS ENGINEERING WORKS,

BARTHOLOMEW STREET, EXETER,

MANUFACTURER OF EVERY DESCRIPTION OF GAS APPARATUS,

Invites particular attention to his

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Where he manufactures both WET and DRY METERS, several hundred of which are in use in many Gas-Works in England, Ireland, and Wales.

These Meters have received the highest praise from many eminent Gas Engineers, for their excellence of manufacture, superiority of workmanship, and accuracy of register. They are warranted to measure correctly and not to vary. Every Meter manufactured by him maintained in perfect repair for a period of *five years*. All bear the Government stamp.

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A variety of very beautiful and choice patterns and designs adapted for any character of buildings, including MEDIÆVAL FITTINGS for CHURCHES, &c.; Handsome STAR PENDANTS for ASSEMBLY ROOMS, &c.; CHANDELIERS, PENDANTS, BRACKETS, &c.

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Every description of GAS APPARATUS, comprising GASHOLDERS, STATION-METERS, GOVERNORS, CONDENSERS, PURIFIERS, RETORTS, SLIDE-VALVES, and every article appertaining to Gas-Works.

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"FIVE MINUTES' TALK ABOUT GAS"

Is intended to be given by Gas Companies to their Customers. It is hoped the advice it contains may be the means of correcting mistakes and preventing accidents; and also of assisting the Officers in some of the most difficult of their duties.

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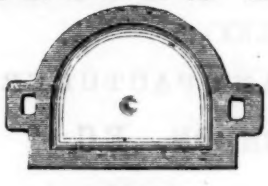

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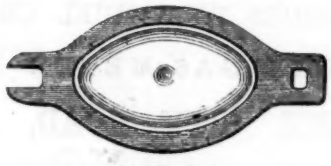

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The Manufacturers desire respectfully to call the attention of Gas Companies and Engineers to their Improved Retort and other Stamped Wrought-Iron Lids, which possess the following advantages over Wrought Lids hitherto manufactured:—Uniform size and shape, a smooth and even surface, and a superiority of finish hitherto unattained. These desirable qualifications are preserved *irrespective of form*.

The Manufacturers have recently laid down extensive Hydraulic Machinery, with a view to acquire the above result, and the success they have achieved in this branch of their business has surpassed their most sanguine expectations. The simple fact that these Lids fit into one die, and are stamped and cut out at one blow, is a sufficient proof that they must be necessarily alike in all respects, and superior to any other make.

The following Gas Companies have the Lids in use, and can certify to their merits:—

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Birkenhead,	Carlisle,	Harrogate,	Nuneaton,	South Shields,
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Bombay,	Croydon,	Leicester,	Portsea Island,	Tunbridge Wells,
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THE

UNIVERSAL EXHIBITION OF PARIS,

1867.

SILVER MEDAL.

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BY THE IMPERIAL COMMISSIONERS FOR THE

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W. P. and Co. invite especial attention to this Meter, which entirely overcomes the difficulty to which ordinary Wet Meters are subjected, owing to the short range of the Float, which is necessary, in order to meet the requirements of the Sale of Gas Act.

"It is well known that n Meters constructed so that the valve will close when the water is drawn off to such a point as to render them 3 per cent. slow the lights are liable to be extinguished by the closing of the valve by a sudden increase of pressure. To meet this difficulty, Mr. Pinchbeck has invented an ingenious and simple arrangement by which the action is reversed, and any such increase of pressure, in his Meter, raises the value instead of depressing it. The fact of the improvement having been adopted by Messrs. W. Parkinson and Co. is a sufficient guarantee that it practically and effectually remedies the inconvenience it is designed to meet."—JOURNAL OF GAS LIGHTING.

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Which can be seen at all the London Gas-Works. Also Liverpool, Manchester, Sheffield, Nottingham, Belfast, Glasgow, Birmingham, Dublin, Bristol, Leeds, Leicester, Brighton, Southampton, Sunderland, Wolverhampton, Bradford, Norwich, &c., &c.

TEST GASHOLDERS, EXPERIMENTAL METERS, EXHAUSTER REGULATORS,

MINUTE CLOCKS, PRESSURE GAUGES, PHOTOMETERS, PRESSURE REGISTERS, &c.

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NOTICES.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 14, 1869.

Notes upon Passing Events.

MR. BAILEY DENTON, with a courage scarcely to be expected from one whose business lies so largely with landowners, continues to press, in a very rational manner, his remedies for the wretched and discreditable condition in which the average agricultural labourer lives and dies. At the Exeter meeting of the Economic Section of the British Association, he was on the same side as that worthy man, and rather wild economist, Canon Girdlestone, although he only agrees with the Canon on one point—that the mental and social condition of the agricultural labourer is usually wretched. The Canon speaks from knowledge of one district, and that in Devonshire, where the squires share the prejudices of the very isolated (and therefore very ignorant) small farmers of that county. Mr. Bailey Denton, as a drainage engineer in large practice, knows nearly all England, and has a store of facts which some men could make very formidable to their opponents; but when he gets into an argument, he always reminds us of "the best good-"natured man with the worst-natured muse." Practised, fluent, courteous speakers, with hollow claptrap, get the best of him per hour. The farmers and their political friends, the landlords of Devonshire, will not, if they can help it, hear one word against the truck of sour cider instead of a money payment, because a good deal of cider, that costs the farmer next to nothing, goes farther with an ignorant peasant for the hour than a silver sixpence. True, it ruins the man's health, and creates tribes of those rheumatic paupers, prematurely aged, who swarm in Devonshire; but it is a tempting bit of penny wisdom and pound foolishness, and it will take some one much more influential than Canon Girdlestone to check the pernicious custom, as long as men like Sir Stafford Northcote sit silent, or give an implied support to debasing county prejudices. Mr. Bailey Denton raised a storm of indignation by stating that the agricultural labourer lives—he might have added, contentedly—on the edge of pauperism. A hard winter brings him, as a matter of course, on the rates; and he looks forward to the workhouse, in his old age, as his inevitable refuge. Gentlemen write to the newspapers to say that it is not so in this or that parish. There are exceptions in certain parishes and counties, but these are invariably found where the labourer has a garden, a bit of potato ground, and a pig-sty for his savings bank. Where the labourer is entirely dependent on wages, and without a garden he is a pauper. Indeed, we firmly believe that, with his present education, an increase of wages would do very little to protect him from pauperism. He lives much better, he is better clothed than his father was when war taxation took a slice of everything he was compelled to consume. Mr. Thorold Rogers talks his usual nonsense when he declares that the agricultural labourer is worse off than when salt, leather, calico, candles, and everything he wore and everything he ate was taxed from 20 to 50 per cent. The true golden age of the peasant was before roads and canals made land valuable. When he made at home his linen, his homespun, and his shoes, and had a forest near at hand for fuel, and a common for the pasture of his swine, sheep, and cow, he enjoyed rude plenty. Wages have a tendency to rise. Mr. Bailey Denton points out that what is absolutely required to put the agricultural community in a healthy condition, is material assistance and mental education. The material assistance, to supply the place of wastes enclosed, is a parish arrangement, by which land, rented at agricultural price by the parish authorities, shall be underlet, in convenient allotments, also at agricultural price, so that no labourer need want a potato ground in addition to his garden; and this to be conducted on ordinary commercial principles, and not hedged round with the numerous restrictions with which so many pious philanthropists stultify their benevolent efforts. For the practical details of this plan, we must refer our readers to Mr. Bailey Denton's pamphlet, "The Agricultural "Labourer." But the mind of the labourer must be raised as much as possible from its present melancholy obtusity. Speakers at agricultural dinners are in the habit of making political capital by drawing comparisons between the condition of the town and country labourer, as if two wrongs made a

right. Thus, the other day, a rural orator attempted to answer Canon Girdlestone and Mr. Denton, by quoting some statistics showing that Lancashire was worse educated than rural England. The idea that a factory hand is less intelligent than an ordinary English ploughman, is absurd. The dwellers in towns get a certain sort of quick intelligence not shared by the ordinary pupils of a parish school. But it happens that the Lancashire educational reformers are vigorously pressing a measure for compulsory education, while the country party, as they love to call themselves, are to a man opposed to anything of the kind. For the education the rural wages-earning population get, they are indebted to the clergy and a few landowners and great farmers. Small farmers, sometimes openly and almost always secretly, prefer labourers and labourers children more ignorant than themselves; but, generally speaking, the children turned out of the parson's school, who can read, write, and cipher decently, are anything but intelligent, because they are almost entirely dependent on memory—their intelligence is not cultivated by teaching them anything in which they can feel an interest. When Mr. Bailey Denton, at Exeter, made use of the unfortunate word "technical" education, he was severely criticized by one of those ingenious opponents of education who object to details while assenting to such a truism as that "education is useful." Mr. Denton, in a letter to the *Times*, urges that the education in rural districts should be directed to those subjects which are familiar to the future ploughboys and dairymaids; that instead of pictures of lions, camels, hyenas, and snakes, he should be familiarized with the live stock of the farm, the insects that destroy the crops, the implements that cultivate them. On the same principle the lessons in geography should commence in the parish, and extend to every place, park, road, pool, and village named on the Ordnance map. We have often urged this point before. Mr. Denton should get his friends at the Society of Arts to take it up. The children thus taught would be more intelligent; their parents and their employers would appreciate such instruction more than purely literary education, which is soon lost, on leaving school, for want of books.

London Bridge has long been too narrow for its traffic; all the attempts to divert this traffic have hitherto only had the effect of increasing it. Whether the new Mansion House Street will bring Southwark Bridge, with its high pitch, more into use, is as yet an unsolved problem. It may be true that the Corporation would have acted more wisely in spending the money they paid for Southwark Bridge in widening London Bridge; at any rate, it is too late to cry over this spilled milk. Mr. Fulton, an engineer deeply impressed by the sufferings of the crowds who night and morning hurry to and from the railway stations, proposes to widen London Bridge by constructing footways outside the present bridge. Without drawings or models on a large scale, it is impossible to say whether this alteration would or would not injure the architectural effect of the bridge. If it would it is a pity, but not a sufficient reason for putting some thousands of persons and many thousand pounds worth of property to daily loss and inconvenience. It would be a calculation more worthy of the time of a statistician than many which fill the papers at the silly season, to ascertain the value of the time lost by vehicles on London Bridge. As the object of a bridge is not primarily ornament, like a spire or campanile, but utility, there can be no more reason for leaving unaltered a bridge insufficient for the traffic for picturesque reasons, than for leaving a bridge unrepaired because a broken arch looks pretty. It is an evil, certainly, to spoil the river view of London Bridge, but not so great an evil as to leave it unequal to its duty. It is not impossible that, without any serious sacrifice of æsthetical canons, architects and engineers, for a proper consideration, will find a way of transferring the footpaths to the outside of the present balustrades.

Science is becoming very troublesome in the army, especially to great chiefs like the Duke of Cambridge—born in the pre-scientific age—whose reputation is royal, not military. It must be a great trouble to a Royal Highness, with no taste for anything more scientific than pipeclay, to be bothered with such disputes as the battle of the great guns—unknown to our Peninsular heroes—breech-loading rifles, telegraphic travelling apparatus, and, last of all, the electric light. The Duke commanding in chief has the family taste for tailoring, at the cost of officers who are not all rich, and dependent for fortune on dress. In pursuance of this taste, His Royal Highness has recently ordered the officers to assume the very scabbard which General Sir Charles Napier, who was a real, not a royal soldier, emphatically condemed for all arms—a steel scabbard. The first effect of the electric light was to find these toys out, and reflect every sword-bearer with a stream of light. The scabbards, still noisy and sword-blunting, are to be blackened. His Royal Highness, it is rumoured, is also going to put muffs on the heads of the Rifles, after the fashion of the Foot Guards—just the thing for deer-stalking. The *Lancet* writer on tight lacing will, perhaps, give a column to the evils of military muffs—on the head, be it understood. As a set-off, we presume, to the steel scabbards and muffs for riflemen's heads, there is a rumour that soldiers are to be allowed to wear beards—a sensible resolve, if true, and due to the happy fact that the Commander-in-Chief and H.R.H. the Prince of Wales both affect beards.

A company is projected for establishing tramways on common roads, as feeder lines, at a cost not exceeding £2000 a mile. Whether any company can raise capital on an important scale for any purpose remains to be seen. At any rate, the general tendency of the public mind is towards cutting the coat according to the cloth. One step in the direction of locomotive economy has been taken by the Great Western Railway Company, which is abolishing as fast as possible the elephantine broad-gauge structures prepared by Brunel to draw wheelbarrow loads, and less. In India official wisdom prescribed a broad gauge of 5 feet, which made all the plant much more costly than if the standard gauge of Europe had been followed; but experience has now led the Indian authorities to contemplate the necessity of cheap feeders to their main trunks on a 3-feet gauge, and general economy in gradients and curves. For India is a country where, except on the military trunk lines, a speed of six miles an hour is more than sufficient. The Victorians, too, of Australia, have decided to consult economy in the extension of their railway system, and sacrifice less to the vanity of erecting monumental works.

The vulgar proverb, that there are more ways of killing a dog than hanging him, has been illustrated in a very ingenious way by the trammelled press of France. Certainly it is not in an article on art in the *Quarterly*, or even in the *Athenæum* under the late cantankerous rule of Mr. Hepworth Dixon, that we should look for an attack on the Government of the day; but in France, where communications, warnings, and prosecutions were the daily incidents in the life of a French Opposition journalist, an exhibition of pictures afforded as good a stick to beat the Imperial mastiff as any. In an article in the *Revue Contemporaine*, on the painters and sculptors of the Paris Exhibition of 1869, a writer re-echoes the complaint often heard in England, that art is becoming a mere matter of manufacture, and, strange to say, that this decay is stimulated by the very encouragement of the want of which our own second-class and unsuccessful artists so often complain. Our critic says, sarcastically, "The Emperor, acting, as usual, "as a tutelary deity, has thought well to give a new lively "and *corrupting* impulse to art, by offering a prize of four "thousand pounds to the best work exhibited." After noticing with approval the great work of M. Chenevard, and M. de Chavannes, who has painted a couple of allegorical frescoes for the new museum at Marseilles, and others, whom he praises or blames, and whose names would not interest English readers, although the style of criticism would, as it is real, and not made up of phrases like the stuff our newspapers often give for criticism, he takes in hand a class of claptrap subjects which, we regret to say, some of our greatest painters have not disdained to use. "There is a new kind of painting, "which has come out within the last few years, that it is diffi-"cult to name properly—anecdote says too little—perhaps "'lackey painting' (*peinture d'antichambre*) would be most "applicable. For instance, here are '*Les Loisirs de Malmaison*' "—the Empress Josephine listening to two young girls sing-"ing. The subject is all the merit, for there is none in the "drawing, the colour, or the execution. As a matter of "course, this picture occupies the best place in the exhibi-"tion; but the artist has a rival in M. D., who formerly "showed talent in painting Russian serfs. It is, no doubt, for "this reason that he took to painting Bonaparte and his sub-"jects! This, however, does not prevent the picture from "being very indifferent. '*Le Général Bonaparte fait sa pre-*"*mière visite à Madame Beauharnais, et accorde a son jeune fils*"*la permission de conserver le sabre de son père.*' It requires "peculiar tastes to admire such subjects; a special exhibiiton "should be made of them, adding '*Napoléon soignant son do-*

"*mestique malade,*' and '*Napoléon regardant dans une lunette* "*d'approche,*' with the old shoes and dirty gloves of Napoleon I., "thus leaving room on the line of the great saloon for really good "pictures. 'The Childhood of Annibal' represents a boy strug- "gling with an eagle. The eagle is very good, and as that is "a speciality in the present day, the artist will, no doubt, "receive Imperial orders." We do not endorse these criticisms, not having seen the pictures, and have, therefore, not given the names of the artists pilloried, but have only made the quotations as an introduction to the following passage descriptive of the present state of art in France, which, from different causes, seems to have arrived at the same degree of manufacture as in England, where we have much that is pretty, little (if anything) that is great:—"The apologists of "personal government are always quoting the ages of Leo X. "and Louis XIV. to prove that art can flourish under a "despotism. We could, on the other hand, cite the reigns "of many despots under which art languished. But in our days "despotism is named 'Legion;' it has taken another form, and "shows itself under the most poisonous shape of *administration.* "That mania for regulating everything, which France pushes to "idiotcy, has invaded the domain of imagination. Louis XIV. "might by accident have good taste, but what claim is there that "twenty-five heads of departments (*chefs de bureaux*) should "have feeling, taste, and knowledge enough to encourage "really *fine* arts? Painting, thanks to centralization, has "become an administrative department. The lucky man "studies, then is named for the Roman Prize, then put on the "supernumerary list, then returns and executes pictures for "churches and palaces, which other official architects build, "and other sculptors—the legitimate children of official France "—decorate. Everything is done with the perfect order for "which our French bureaucracy is celebrated. The men of "genius are tabulated and arranged in alphabetical order as "draughtsmen and colourists. The orders are registered like "salaries—so many chapels to this one, so many ceilings to that "one. He who has done two saints must proceed to paint "battles or a congress. Decorations, from the simple to the "Grand Cross, mark the progress; the Institute comes in due "course, and the Senate crowns the official and artistic career. "Nothing can be less like the patronage of a really great king. "Painters without patronage paint anecdote, and seek the "patronage of the best substitute for Secretaries of State— "picture-dealers. One paints girls in velvet; another, swells "of the period of Louis XIII.; another keeps a warehouse of "Breton peasants; another deals in sheep and poultry neat as "new pins. Thus the manufacture of pictures is brisk or dull, "but it is a manufacture! In this fœtid condition a prize of a "hundred thousand francs will not create men of genius. "Great examples and noble ambition make great artists, not "times when money is the all in all." In England picture-dealers are the patrons of art, and never were there more pretty things turned out every year; but as every young English artist expects to marry, and every successful artist's wife expects her brougham, her maid, her annual tour or sea-side villa, we must be satisfied, and not expect to breed genius.

Resuming our remarks on the Report of the French Commission on Technical Instruction, we notice that the commissioners also report on the establishments for technical education in France; but these are so familiar to those interested in the subject, that it is not necessary to refer to them here at any length, and we shall content ourselves with extracting a few curious paragraphs. For instance, in a memorial presented, in 1854, to the Emperor, by the Director of the Paris Conservatory of Arts and Trades, after referring to the efforts made in England—taught a lesson by the first International Exhibition—to improve the arts "dependent on taste, form, and "colour," he proceeds, with a self-conceit peculiarly French, to say that "it would seem as if the English were bent on "operating on the human species as they have on races of "animals, *so as to transform a nation of traders and artisans into* "*a nation of men of taste.* How far the Anglo-Saxon race is "susceptible of this transformation is a philosophical question "beyond my province, but one thing is certain—namely, that "in a few years England will have made considerable progress "in the arts of design. In France, on the contrary, narrow "views of cheap production prevail, which constantly tend to "the degradation of art; and if a great establishment com- "bining models of ancient and modern art, combined with "methodical teaching, be not available to revive and correct "taste, there will be a decline." Now, as we have frequently before observed, the superior taste of the French in certain departments of fabrication is unquestionable; but there are strong reasons for believing that this is cultivated, and not innate in the Latin, as distinguished from the Anglo-Saxon race, as regards form. If it were not so, how is it that the cheap pottery, all the cutlery, all the ironwork introduced into building—such as locks and hinges—where an artist is not consulted, is of such rude and hideous forms compared with English manufacture? English gardens, parks, cottages, and villas are as superior in taste to the ordinary designs of the same kind in France, as Parisian shop windows are superior in tasteful display to those of London. At the same time it is probable that great mechanical ability in artisans is inconsistent with close attention to art. In 1864 the Conservators of Arts and Trades in Paris supplied "lectures on science applied to art, afforded appli- "ances for experimenting, the use of a library on science and "industrial art, and a gallery of designs for the public to copy. ". . . . . The Schools of Arts and Trades supply our work- "shops with young men who quickly become excellent over- "seers; but theoretical studies are not sufficient to form "skilful engineers. . . . In the Polytechnic School half "the pupils choose the military service, and of the other half "a great number abandon the civil service to follow scientific "pursuits. . . . . There is good reason to fear (*sic.*) "that if the pupils of the Polytechnic School were left free to "choose between the posts offered by private industry and "those reserved for them by the Government, the cleverest of "them would give the preference to industry which is more "liberally remunerated. The Government, for this reason, "has forbidden its engineers to serve any other companies "except railway companies." The Central Imperial School of Arts and Manufactures gives a scientific education, and grants diplomas which are a recommendation to pupils applying to manufacturers for employment. Public and gratuitous lectures to the working classes have been established in Paris within the last seven years, and have been very successful. They seem to be of the kind given at our mechanics and literary institutions, the most amusing being the best attended; as, for instance, one on the Suez Canal, by M. de Lesseps. The jealousy of the French Government of unofficial institutions is amusingly and unconsciously illustrated in the following report on libraries for the people:—"Three or four years ago "a certain number of working men united for the purpose of "forming, in the third *arrondissement,* a people's library on a "new plan. The statutes of this society, approved by the "Minister of the Interior, authorized the calling of general "meetings whenever necessary. At one of the first general "meetings, at which we presided as president of the society, "the committee proposed to appoint as honorary president "the mayor of the *arrondissement,* who had kindly granted "the use of the town-hall. The discussion on this motion "was calm and well conducted, but the majority rejected it. "After this meeting the Prefect of the Seine withdrew from "the Society of Friends of Instruction the use of the hall, and "the minister revoked his authorization of the statutes. "After an interval of three months the society was recon- "stituted on the basis that the society was to be managed by a "president selected by the Minister of the Interior, and a "committee proposed by the president and approved by "the minister; the mayor to be *ex officio* honorary president, "and to be present at the annual general meeting. The cata- "logue of books to be approved by the Minister of the "Interior." All this fuss for a little lending library of four hundred members! The mayor, be it remembered, is an officer appointed by the Government. Imagine the Home Secretary interfering with the officers and discussions of a working men's library in Shoreditch. But, on consideration, it is not astonishing that the French Imperial Government should distrust an association of workmen, when it dare not trust wealthy agriculturists. The French Agricultural Society was founded in avowed imitation of the English society. The first president was M. Drouyn de Lhuys, an ex-minister and senator. The council was composed of wealthy and distinguished land-owners and men of science. We do not know if its statutes have yet been sanctioned by the Government; at any rate, they were not some months ago, the Government having claimed an amount of interference to which the distinguished gentlemen who had founded the society were not inclined to submit. Such is the government of fuctionaries which a certain school of new-light reformers recommend for our

imitation. Fortunately, when the Education and Charity Commissioners give us the education open in Germany and Switzerland to the humblest, neither Home Secretary nor mayors will attempt to embarrass self-improvement associations.

THE SUBSTITUTION OF GAS FOR OIL IN LIGHTHOUSES.

The papers relative to a proposal to substitute gas for oil as an illuminating power for lighthouses, to which we alluded in our last number, give a succinct history of the experiments made and the results obtained. In the latter part of 1863, Messrs. Edmundson, of Dublin, wrote to the Commissioners of Irish Lights, suggesting that a far superior light might be obtained from oil gas, by means of their "crocus" burner, than was to be obtained from oil itself burnt with a wick. After a good many preliminary experiments, the commissioners were convinced of the superiority of the gaslight, and, with the sanction of the Board of Trade, it was brought into use at the Howth Lighthouse in June, 1865. The first year's working of the oil gas system proved a saving of £50 in cost, as compared with the expense of a first-class 4-wick light, with an illumination four times more powerful. Subsequently, however, a new composite crocus burner was introduced, and cannel was substituted for oil gas.

The composite burner consists of a series of concentric fish-tail jets. The burner in ordinary use at Howth is formed of three rings, which carry 28 jets; but to this central group can be added in succession four other rings, each carrying 20 jets, so that, according as the weather is clear or thick, the light of either 28, 48, 68, 88, or 108 jets may be exhibited. The most powerful oil-lamp in use in lighthouses consists of four concentric wicks, which give rise to four concentric cylinders of flame four inches in height. It was with a lamp of this kind that Mr. Valentin compared the illuminating power of the gas-lights, with the following results, the light of the lamp being taken as the unit :—

Four-wick Lamp.		Gas-Flame.		Number of Jets.
1	....	2½	....	28
1	....	4¼	....	48
1	....	7¼	....	68
1	....	9¾	....	88
1	....	13	....	108

So far, then, experiments with Bunsen's photometer showed the 28-jet gaslight greatly superior to the oil-light; but on comparing the two from a distance, it was found impossible to say which was the best. When an artificial fog was made, by interposing a screen of oiled calico and a piece of muffled glass, the gaslight seemed to possess a little superiority in penetrative power; but the advantage was not great, and, as a practical result, the conclusion was come to that the 28-jet burner, consuming 50 feet of gas per hour, will give a light fully equal to that of the 4-wick oil-lamp.

The coal used at Howth is Stockwell cannel, delivered at 35s. per ton, and the gas made is said to have the illuminating power of 38 candles. The cost of it is about 10s. per 1000 feet, and the annual cost of the light, with the burner consuming 50 feet per hour, is estimated at £94 5s. The expense of the oil-lamp for the same time is calculated at £168, which shows an annual saving of £41 5s. by the employment of gas. We ought to add that Mr. Wigham, by perfecting the arrangements, hopes to obtain an equal light by the consumption of 33 feet per hour, which will increase the annual saving to £73 12s.

In our opinion, however, and in that of Dr. Tyndall also, the strongest recommendation to the use of gas consists in the ease with which the light may be increased as the state of the weather may need it. For that reason alone its use should be encouraged at every station where it is possible to obtain it.

What there is peculiar to the coast of Ireland which makes the gaslight much superior there, while it exhibits but a very slight superiority on the coast of Scotland, it is impossible to say; but such would seem to be the case. These papers also contain short reports by the Messrs. D. and T. Stevenson, of Edinburgh, on experiments made by Messrs. Edmundson in a temporary tower at Granton, first with Edinburgh and Leith gas, and then with gas specially made from coal costing 47s. 6d. a ton. The experiments, it seems, did not at all confirm the results obtained in Ireland, and Messrs. Stevenson report to the Commissioners of the Northern Lights that there is nothing either as regards power or cost to warrant them, with their present information, in recommending the adoption of gaslight in Scotland. We must leave it to the authors to reconcile these somewhat conflicting reports.

Communicated Article.

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ON THE CONDITIONS WHICH AFFECT THE REGULATING ACTION OF A GAS GOVERNOR.

By F. W. Hartley.

There is no instrument more misrepresented, and it may be almost said misunderstood, as regards its functions and power, than the gas governor. Statements are commonly made by many "inventors" and "patentees" of the smaller instruments known as "consumers governors," which, if true, would prove the governor to be the most marvellous and, mechanically considered, most perplexing instrument in existence, for its powers would not only extend to the efficient regulation of pressure, but also to the subjugation of the force of gravity and of the effect of friction, upon which, to a large extent, depends the quantity of gas which it is possible to transmit through pipes under any given pressure.

It is quite common for makers of the class mentioned to assert that the governor (at least as made by them) possesses the power to maintain an equable consumption of gas at each burner supplied through it, irrespective of the number of burners in use at one time, and however the burners may be distributed. No assertion could be more fallacious. It is, however, accepted as true by the public, although possibly by few, if any, mechanical men or gas managers. Nevertheless cases frequently occur, as the writer can testify from personal experience, in which the governor is expected, even by gas engineers, to do much more than lies within the compass of its capability. Indeed, cases have come under the writer's notice, in which the governor has been roundly abused and called ineffective because it failed to act in antagonism to the principle upon which its action is dependent.

The writer has often given a *vivâ voce* exposition of the conditions which affect the action of the governor, but as another case of "great expectations" has come under his notice, he is induced to state his conclusions in the pages of the Journal of Gas Lighting, supporting those conclusions by reasoning and particulars of illustrative experiments, so that the subject, which is both interesting and important, may be fairly laid before the gas world, and erroneous opinions on the part of the writer or on the part of others refuted.

1. If a governor be charged with sufficient gas to raise the gasholder, and bring the valve into action, then on closing both the inlet and outlet, and weighting the governor, the pressure on the outlet (and, of course, on the inlet) will be equal to the downward pressure of the governor.
2. If the valve be gas-tight when closed, then on admitting gas to the inlet at a pressure in excess of the acting pressure of the governor, the outlet pressure will not be much disturbed although the outlet be still stopped, and the inlet pressure may be increased almost indefinitely without affecting the outlet pressure. If, however, the downward pressure of the governor be very small, an increase will take place sometimes on the outlet, but this increase soon reaches its maximum, and heavier inlet pressures produce no further effect.
3. If gas be discharged through a governor, the pressure in a horizontal pipe through which the gas is being discharged will be less than the acting pressure of the governor, and the difference will be in proportion to the distance of the point of observation from the governor and to the rate of discharge; in other words, in proportion to the loss by friction.

Experiments.

(*a*) A King's gauge was attached to the outlet of a small governor, whose inlet was connected to a gas-supply pipe. The governor was charged with sufficient gas to bring it into action, and the inlet and outlet being closed, the governor was weighted to give 5/10ths. The gauge indicated 5/10ths. The inlet was then opened for the admission of gas at 1 inch and higher pressures. Pressure on gauge, 5/10ths and 5¼/10ths nearly.

(*b*) Same as No. 1, but governor weighted to 3/10ths only. On opening the inlet, with gas entering at 1 inch, the gauge rose to 4/10ths, but no further increase took place on increasing the inlet pressure.

(*c*) The gauge on the outlet of the governor as before. Inlet pressure, 1 inch. Pressure on gauge with outlet stopped, 5¼/10ths nearly. Pressure on gauge with gas passing freely, 3/10ths nearly. As the outlet opening was diminished, the pressure on the gauge increased, until, with outlet stopped, it again reached 5¼/10ths. With greater inlet pressures similar results were obtained. When the outlet was stopped, each tenth added to the acting pressure

on the governor gave a tenth increase on the gauge; but, when gas was freely escaping from the outlet, 5/10ths increase of the acting pressure of the governor gave only 3/10ths increase on the gauge.

It is quite manifest that a governor cannot maintain equality in the rate of consumption *per burner* when the number of burners is varied, and when the gas is transmitted through pipes. A loss of pressure must arise from friction, which loss, all other things being equal, will vary with the rate of discharge.

When the largest number of burners is in use, the difference between the acting pressure of the governor and the pressure at each point of discharge will be at its maximum; but as the number of lights is diminished, so will the difference be reduced, and the pressure at the burners approach nearer and nearer to that of the governor. As a necessary consequence, the consumption *per burner* will be increased.

It might be thought, perhaps, by any one not well informed, that if such an effect as that last mentioned takes place, the governor can be of little value; but a moment's reflection will show the error of such an opinion, and that the governor is a most valuable instrument. It has already been shown that the governor will regulate to the extent of preventing the pressure rising higher in its outlet than that due to its own acting force. It thereby prevents such an excessive waste of gas from burners, or from defective joints, &c., in mains and pipes, as would inevitably occur if the gas were allowed to act with the full force of the pressure with which it enters the governor.

Regulation by means of a cock or valve never can be so effective as the automatic regulation by a governor, because a degree of watchfulness and attention such as never could be brought into operation would be demanded. Moreover the requirements of supply could not be known with sufficient promptness to ensure regulation at the proper moment.

Experiment (*c*) furnishes a striking illustration of the most valuable power and action of a governor—viz., the permitting, while maintaining the same pressure *within itself*, the passage through it of varying quantities of gas; the variation being dependent (within the limits of the size of each instrument) on the *area of the discharge opening*. It shows, moreover, that, whenever it is desired to limit and fix the rate of discharge under any given pressure, it is absolutely necessary to fix the dimensions of the discharge opening. Hence it is important, with such things as street-lamp regulators, to adjust each to the required consumption and pressure with the burner actually to be used with the governor. Such burner should not be exchanged for another; or, if another be substituted, the governor should be retested, and, if needful, a readjustment made.

4. If gas has been delivered at a certain pressure through a governor into a sound main, upon which there is no draught, a reduction in the acting pressure *of the governor* will not lead to an equivalent reduction of pressure in the main; and the amount of reduction will be dependent, but *not wholly so*, on the proportion in respect to capacity which the governor bears to the main.

Experiments.

(*d*) A sound pipe, of a capacity of about 1½ cubic foot, was connected to the outlet of a small governor, and also to a King's gauge. The governor was weighted to 14/10ths, and gas at that pressure allowed to pass through into the pipe on the outlet. The gauge, of course, showed 14/10ths. The acting pressure of the governor was reduced to 3/10ths, and the pressure on the gauge fell to 12/10ths. A small leak existed in the pipe, and in 15½ minutes the gauge fell gradually to 38/100ths, and then rose instantly to 4/10ths. During intervals of one minute it continued to fall gradually to 38/100ths, and to return suddenly to 4/10ths. This effect was due to the soundness of the valve, which, when in its seat, permitted no gas to enter the governor; but, when the escape from the pipe had caused a certain diminution in the sustaining power, the governor, with a slight downward jerk, opened the valve for an instant, thereby admitting enough gas to restore the pressure.

(*e*) The experiment was repeated with the pipe quite sound. The gauge fell to 12/10ths, showing a reduction of 2/10ths.

(*f*) The gauge was attached directly to the outlet of the governor, and a pressure of 14/10ths allowed to act through the governor. On reducing the acting pressure, as before, to 3/10ths, the gauge fell to 11/10ths, and to a little below, showing a reduction of 3/10ths and of 35/100ths.

(*g*) A governor of larger capacity was tried under the same conditions as in Experiment (*e*). The gauge fell to 1·03 and 1 inch, showing a reduction of 37/100ths and of 4/10ths.

(*h*) The governor used last was tried with the gauge alone, as in Experiment (*f*), and the gauge fell to ·8, showing a reduction of 6/10ths.

It will be observed that, as the cubic capacity of the governor approached that of the pipe or gauge on its outlet, a greater diminution of the pressure in the gauge took place, and if the whole or a sufficient part of the gas required to bring the governor into action could have been drawn from the gauge or from the pipe, then the diminution would have been complete, and the pressure on the gauge brought into agreement with the acting pressure of the governor. Part of the gas was, however, derived from the inlet. It was found with the larger governor that the latter quantity amounted to about 138 cubic inches, and, as the capacity of the governor was 163 cubic inches, it follows that only about 25 cubic inches of gas were drawn from the pipe or gauge.

The writer thinks that the experiments demonstrate the correctness of the conclusions, which he has given in the form of propositions, and which he arrived at by reasoning on the actual effects of governors in practical use.

A consideration of the conditions required to secure efficient action leads to the following practical rule, as the one to be adopted when the mains are *very nearly* or *quite sound*, and *no day consumption* of gas takes place:—

Reduce the acting pressure of the governor to the minimum during the time of supply.

The time occupied in effecting the reduction may be *five hours* or *five minutes*, but must be long enough to allow sufficient gas to be discharged to relieve the compression in the main. If the valve of the governor be not gas-tight when closed, a diminished regulating effect will take place, according to the proportion which the area of unsoundness (so to speak) bears to the area of discharge from the main.

It would be easy to show the degree of compression of gas under various pressures and in mains of various areas and lengths, and also the quantity of gas which must in each case be discharged to bring the pressure into equilibrium with that of the governor; but the writer thinks that he may be excused from entering into calculations which could only be of interest to the purely scientific engineer; unless, indeed, it were deemed advisable to relieve the excess of pressure when it arose, by opening a small pipe extended from the main to a supplementary gasholder weighted to the same pressure as the governor, or by pumping—plans not very likely to find acceptance among gas engineers, but which would demand the determination, as a preliminary, of the quantity of gas to be removed.

55, *Millbank Street, Westminster, Aug.* 20, 1869.

Correspondence.

PURIFICATION OF GAS BY DRY COPPERAS.

SIR,—In your number of the 31st ult., you quote a favourable notice by the President of the North British Association of Gas Managers, of an article named "dry copperas," specially adapted for the purification of gas from ammonia and from sulphuretted hydrogen. You, however, make the mistake of stating that it is patented by J. Berger Spence, of Manchester. I shall feel obliged if you will, by inserting this, place the saddle on the right horse, as I am the patentee. The specification is dated Sept. 26, 1868, No. 2959.

PETER SPENCE.

Pendleton Alum-Works, Manchester, Sept. 3, 1869.

THE COUNTY AND GENERAL GAS COMPANY.

SIR,—My attention has just been called to your publication of the 17th ult., in which the following paragraph appears:—"The liquidators of the County and General Gas Company, Limited, have declared a dividend of 10s. in the pound, on the debts proved, and, as there is still some property to realize, it is possible the debts may ultimately be paid in full. We believe, however, that there is very little chance of the shareholders receiving anything." As such an announcement will tend to mislead the shareholders, permit me to state distinctly, not only that there will be something to refund to them, but in the event of the works still remaining unsold—viz., Ely, Northfleet, and Pembroke—realizing in proportion to those already disposed of, the return will be something considerable.

WILLIAM J. WHITE, *One of the Liquidators.*

33, *King Street, Cheapside, Sept.* 7, 1869.

Miscellaneous News.

SOUTH SHIELDS GAS COMPANY.

The Half-Yearly Meeting of Shareholders was held at the Company's Office, on Monday, Aug. 30—R. WALLIS, Esq., in the chair.

The SECRETARY (Mr. J. W. Lawson) having read the advertisement calling the meeting,

The CHAIRMAN said: I am happy to meet you again at another half-yearly meeting of the company, as we still continue in a prosperous condition. It is true that this half year we have not, perhaps, exactly realized our dividend, and we have had to draw a little upon the balance, but still we must consider ourselves in a most satisfactory condition. I may say, as you remember, that last half year we increased the salaries of our engineer and our secretary; we have had every reason since then to think we did a right and proper thing, for two more efficient officers I think we cannot possibly have. In the management of the retorts, more especially during the last half year, there has been great economy exercised; indeed, we have more proceeds from our retorts, with less labour, than we used to have, and the yield of gas from the retorts is something extraordinary to what it was eighteen months ago. I believe the greatest economy is used in the

management of the works themselves, as well as in the office, and I am also quite sure that care and attention are paid in both these departments to the interests of the company. The slight increase in the salaries was perhaps one of the causes by which we have had to withdraw from our little balance, but still we altogether have great reason to be satisfied with our position. If any gentleman has any questions to ask I shall be most happy to answer him, but in the meantime I will move that the seal of the company be attached to the register of shareholders.

This having been seconded, was agreed to.

The report having been taken as read,

The CHAIRMAN moved that the report and accounts be received and adopted, which was seconded by Mr. H. HEWISON, and agreed to.

Mr. H. NELSON referred to the determination of the directors not to proceed at present with the lighting of the Boldon district, and remarked that it was desirable they should keep another company from their ground. Of course he had not the information possessed by the chairman in reference to this matter, and therefore he had taken the opportunity of making inquiry regarding it.

The CHAIRMAN said the subject had been well considered by the directors, and Dr. Armstrong, who had taken great interest and trouble in the matter, would kindly state his views thereon.

Dr. ARMSTRONG said it was not recently only that the directors had had this subject before them, it having been discussed by the board many months ago. Every inquiry had been made as to the number of persons likely to take the gas, and the engineer had even been directed to ascertain the cost of laying the pipes. The result was that it was found it would not pay to take the gas to Boldon—at present, at any rate. The utmost revenue they would receive on going would not meet the expenses, to say nothing of a return to the shareholders. He then moved—"That an interim dividend of 4½ per cent. on the old and 3½ per cent. on the new capital be declared for the half year, payable on the 7th of September."

Mr. NELSON seconded the motion, which was carried.

Mr. W. ANDERSON moved—"That the paid-up £10 shares be now consolidated into a general stock according to the respective interests held by the shareholders, as set forth in the 61st section of 8 Vic., cap. 16."

Mr. J. M. MOORE seconded the proposition, which was carried.

Mr. J. M. MOORE proposed a vote of thanks to the directors for the care they had exercised in attending to the interests of the shareholders during the past half year.

Mr. E. WILLIAMSON seconded the motion, which was carried.

The CHAIRMAN acknowledged the vote, and said his best endeavours should always be at the service of the company, to continue it in the prosperous condition it was now in. He hoped that from time to time the company would add something to their reserve-fund.

Dr. ARMSTRONG proposed a cordial vote of thanks to the chairman, for his continued attention to the interests of the company.

Mr. NELSON seconded the motion, which was carried with acclamation.

The CHAIRMAN acknowledged the compliment, and the proceedings terminated.

BOLTON GAS COMPANY.

The General Ordinary Half-Yearly Meeting of the Shareholders of this Company was held in the Board Room at the New Offices, on Wednesday, Aug. 25—THOMAS MOSCROP, Esq., chairman of the board of directors, presiding.

The CHAIRMAN, on signing the register, stated that the number of shareholders continued to increase, the present number being 283; last half year it was about 260.

The following is an extract from the directors report for the half year ended June 30:—

On capital account the outlay has been £5808 18s. 3d. In revenue account the gas-rental shows a considerable increase over the corresponding period of last year, but the proceeds of the sale of coke are much less; the cost of cannel has increased, also that of renewals of retorts and of repairs of iron and brickwork have been heavy. The balance of profit is £5741 9s. 5d., the half year's dividend will take £6136 13s. 3d., thus requiring the sum of £395 13s. 3d. from reserved fund, leaving the amount of that fund £13,888 18s. 1d. The dividend will be as follows:—

5 per cent. on £64,498 10	£3224	18	6
3½ „ 89,592 0	2911	14	9
Total . . .	£6136	13	3

It is with deep regret the directors have to record the loss by death of their highly esteemed colleague, James Taylor, Esq.

The report and balance-sheet having been taken as read,

The CHAIRMAN said: Gentlemen, the first item in the balance-sheet to which I will direct your attention is on the credit side of the revenue account—"Gas-rental"—not only the first in arrangement, but also the first in importance and the highest in amount. The rental for the last six months is £18,401 15s. 9d., as against £16,734 11s. 8d. for the corresponding period of last year, making an increase this half year of £1667 4s. 1d. The increase is somewhat remarkable, and in order to make it more clear I will compare the quantity of gas sold in 1866 with that sold this year. The quantity sold in that year was 173,035,000 cubic feet; but in the year ending June 30, 1869, the quantity sold was not less than 221,731,000 cubic feet, which is an increase on the three years of 48,696,000 feet, or 28·1 per cent. The increase in the number of consumers during that period is as follows:—In the year 1866 the number was 12,600; in the year 1869, 15,000—making an increase in the three years of 2400, or about 20 per cent. The amount of cash received in the year 1866 was £30,932 8s. 2d., and in the year 1869, £37,268 14s. 11d., or an increase in the latter year of 20·4 per cent. Of course we are all aware that the gas-rental constitutes our sheet-anchor in the concern, but while the residual products and the manufacture thereof are secondary and subsidiary, yet they also are of great importance, and upon their success and the attention paid to them very much depends the prosperity of the undertaking. Unfortunately, as you are aware, not only with us, but with every gas company, the market value of these articles has very much depreciated. For instance, the proceeds of the coke this half year amount to £853 8s. 9d., as against £1098 15s. 5d. in the corresponding half of last year; being, in point of fact, an actual decrease of £245. Had we been able to obtain the same price as in the corresponding period of last year, we should have made, instead of that amount, £1300 or £1400, or an increase of £450. Again, in the article of tar, the proceeds are £797 12s. 6d., as against £724 1s. 4d. I can only observe that had we been selling tar at the price we did under the old contract, instead of our return being £797 12s. 6d., it would have been not less than £1395, making a difference in the sales of this half year, in that one article, of £598. I will now direct your attention for a moment or two to the debit side of the account. The first item there is "To cannel carbonized or consumed, £9059 1s. 5d.," as against £7797 11s. 4d. in the corresponding half of last year. This amount is larger, in proportion to the quantity of gas made, by a sum of not less than £587 1s. 5d. The explanation of that is that we have been using a higher priced cannel, equivalent to about 1s. per ton. I will just observe, in passing, that I this morning happened to have in my possession a table showing the illuminating power of the gas made for the last 12 years, and I find that the illuminating power of our gas was never so high as during the last 12 months. I need not remind you that the price of gas is no criterion as to its relative cheapness or dearness, but given the price and the illuminating power, then, by a simple arithmetical calculation, you arrive at the amount you pay for the light you derive. For instance, the price of London gas is 4s. per 1000, and its illuminating power is 12 candles. Now, for a light equal to 1000 standard candles you have to pay 1s. 8d. The price of Birmingham gas—which is one of the lowest, if not the lowest, in the kingdom—is 2s. 9d. per 1000, with an illuminating power of 14 candles; but the quantity of gas yielding a light equal to 1000 standard candles costs 11·78d., or 11¾d. The price of the Bolton gas is 3s. 4d. per 1000 feet, with an illuminating power of 20 candles, and for the quantity of that gas which will produce a light equal to 1000 candles you have to pay 10d. Thus for the same amount of light you have to pay in Bolton 10d. as you would have to pay in Birmingham 11¾d., and in London 1s. 8d. The next item which I will direct your attention to is, "Retorts, materials, and labour, £360 11s. 4d.," as against £250 2s. The increase on that item you will observe is £110 9s. 4d. The reason of that increase is this: we have had to take down an unusually large number of retorts, and have them replaced by new ones. We act upon the principle that, in order to make a good article, you must keep the plant in thorough repair and in good working order. The next item is "To repairs of iron and brickwork, £1573 4s. 9d.," as against £1443 15s. 4d. The increase there is £130 9s. 5d. That is accounted for thus: we have had to repair the large station-meter at the Lum Street works, we have had to pay an account of £104 for paving done in 1868, and we have had to make the alterations in the offices in Gas Street necessary for converting them into a residence for the out-door superintendent. The next item to which I shall direct your attention is "Rates and taxes," amounting to £690 1s. 5d., as against £570 0s. 11d., or an increase of £139 above the average for the last five half years. Having now referred to the more noteworthy items in the revenue account, if you will bear in mind the facts and figures just brought before your notice, you will perceive that the real loss by depreciation in market value of the two residual products, coke and tar, is a sum of not less than £1048, and on the debit side we have exceptional or extra expenses in cannel, retorts, repairs of iron and brick work, and rates and taxes, equal to the sum of £967 10s. 2d., which, together, amount to £2015 10s. 2d.; and when, under these circumstances, we can state as the result of this half year's business, in the words of the report, "the balance of profit is £5741 9s. 5d., the half year's dividend will take £6136 13s. 3d., thus requiring the sum of £395 13s. 3d. from reserved fund, leaving the amount of that fund £13,888 18s. 1d.," the directors, and I feel sure the shareholders also, will concur in saying that, upon the whole, the balance-sheet is a source of satisfaction and congratulation for the present, and certainly it is replete with hope as regards the future. With regard to the capital account, on the debit side you have the items showing that the total amount expended during the half year is £5808 18s. 3d., and the first item on that account is "Mains, £1319 10s. 7d." The principal part of this item is for the extension of pipes from Bark Street, along Bridge Street, Higher Bridge Street, Blackburn Road, to an extreme point in Astley Bridge. At present the pipes there are very irregular, small, and defective. The fact is, I think the first is a 6-inch pipe which goes as far as Dale Street, and then, singularly enough, it is joined by a 4-inch to the end of Kay Street, and then is followed by a 6-inch pipe. We purpose laying an 18-inch pipe from Bark Street to the Waterloo, and then joining that pipe with a 14-inch pipe to be continued along to Stones's Mill, at the extreme point of Astley Bridge. Those items together involve an outlay of not less than upwards of £2000, the cost of the pipes being about £1800, and labour and materials £250, the former being charged to the capital and the latter to the revenue account. It was not without considerable hesitation, and thoroughly investigating the merits of the case, that the directors decided to spend that amount in that district. To show you the necessity of it, I will just remark that, only nine years ago, the yearly consumption in that district, which comprises the streets already referred to, and also the adjacent streets, and continues right on to Eagley, Dunscar, Chapeltown, and Turton, was not more than 15,150,000 cubic feet, whilst last year it amounted to 41,485,000 cubic feet, or an increase during the nine years of 173·8 per cent. We have had repeated complaints (and we do not wonder at them) of short supply and defective pressure in that district. Our two largest consumers, the corporation excepted, are in this very district; therefore I think you will not wonder, after this explanation, that we have decided to adopt the course here indicated, and we have not the slightest doubt the proceeds from this very outlay will immediately more than pay the interest on the additional outlay. The next item I shall notice is, "Retorts, £775 13s." This represents our outlay on account of the erection of a new stack of 100 retorts. Our very large, continuous, and very rapid increase of consumption of gas presupposes, of course, that there must be corresponding increase of manufacturing power and also of storeage and distributing capacity, and hence, to provide for that, it has been necessary to erect this new stack of retorts; and the same reason may be given for the next two items, the gas-tank and apparatus. You have on account of new gas-tank, £821 16s. 4d. It is somewhat remarkable that at this very meeting three years ago we had similar items for the new tank and gasholder already erected in immediate contiguity to the one before us. This one is to be a fac-simile of the one built three years ago. It will be about 32 feet in depth, 142 feet in diameter, and will be calculated to contain a gasholder which will have a capacity for storeage of not less than 880,000, or nearly 900,000 cubic feet of gas. "Apparatus, £446 5s.," simply represents the steam-crane and the portable engine, which are required for excavation and other purposes incidental to the formation of the tank. With these remarks, I submit for your approval the following resolution:—"That the balance-sheet and scheme for dividend prepared by the directors, exhibiting a true statement of the capital, stock, credits, and property of the company up to June 30, 1869, and showing the profits of the company and apportioning the same, and which has been duly examined and verified by the directors, and signed by the chairman and two directors and their accountant, and also audited by the auditor, be and the same is hereby approved, and that in accordance therewith a dividend be and the same is hereby declared of £10 per cent. per annum on the old shares, and £6 10s. per cent. per annum on the paid-up capital of the new shares, and that the same be paid forthwith, free of income-tax."

Alderman C. SKELTON, in seconding the motion, said he thought the balance-sheet was very satisfactory, and the full explanation the chairman had given he thought must satisfy all the shareholders that the position of

the company was good and safe. Although a little had been taken out of the reserve-fund, he had no doubt they would be in a position to return it before long.

Alderman WOLFENDEN said he did not intend to say anything on the general bearing of the statements the chairman had made, except just to call the attention of the meeting to one or two features of the accounts which had occurred to him. He found they were much increasing their capital, and at the same time decreasing their profits. He held that the main interest on an occasion like that lay in the fact of what they were receiving for gas sold, and what they were paying for cannel or coal consumed. The rest of the items were subsidiary in every respect, and had not that importance in his eyes they might have in the eyes of some. They had expended as capital at June, 1868, £152,744, and at June, 1869, £163,869; an increase in the past year of £11,125. At June, 1868, they had a profit of £6194 upon the half year, but the profits for the half year ending June, 1869, were only £5741; a decrease of £453. Whatever the causes might be for that state of affairs, unless they were absolutely exceptional, and could be shown to be so, his argument as to the inexpediency of this state of things was unanswerable, because, if there must be a lessening of the reserve-fund each successive half year to pay dividends, it would follow that a time must come when that could no longer be done. He did not himself take so gloomy a view as to say that that was likely to happen; but, at the same time, what he had said was nevertheless true in itself. Coming to the leading items for gas-rental and cannel for the half year ending June, 1868, and also for the last half year, there was something which to his mind was not exactly clear, and which he considered ought to be explained. It was well known in this district that for the last year or two the price of coal and cannel had been tending downwards somewhat rapidly, and he dare say that coalowners would tell them they were now working at a loss. He found that the cost of cannel consumed had increased in a ratio disproportionate to the expansion of the gas-rental derived. For the half year ending June, 1868, the gas-rental was £16,734, and the cannel cost £7797; whilst for the last half year the gas-rental was £18,401, and the cannel cost £9059. If any one would make a rule-of-three question of those figures, he would find that, as the gas-rental of £16,734 in June, 1868, needed a cost in cannel of £7797, so in June, 1869, the £9059 for cannel should either have been less by some £500, or else have produced a gas revenue larger than the amount set down in the accounts. That being so, and it being clear there was an excess this half year of some £500 in the item of cannel, and as the decrease in profits was £453, it followed that the decrease turned on that item. He did not attach importance to the relative income from residual products, as he had stated earlier, and he thought they ought not to be dwelt upon so much by the chairman at a meeting of this kind. In the half year ending June, 1868, the whole of the income put together other than gas-rental realized £4659, and in the last half year £4928; therefore there was an increase of £269. Dismissing the smaller items, and coming home to cannel and coal and the gas-rental realized, he should be glad, not only for the satisfaction of the shareholders, but also for the satisfaction of the gas consumers interested in the matter, if the chairman would explain why, with a falling market in cannel and coal, there was a disproportionate increase of cost of something like £500 as against the amount of money derived from the sale of gas in the past half year.

The CHAIRMAN: I do not exactly see the consistency of Alderman Wolfenden's remarks in talking so disparagingly about our residual products, when I have just read in his hearing that this very half year, had we sold our coke at the price we got in the corresponding period of last year, instead of receiving £853 8s. 9d., we should actually have received £1300, making a difference in that one article of £450. Then again as to tar, one of the articles in reference to which our friend speaks so disparagingly about the chairman having noted it in his accounting for the difference in the balance, had it not been for the depreciation in its market value, we should have been in a much better position. The fact is we received 27s. per ton under our former contract, and now, after doing the best we could, and advertising it in all the papers, we could only get 15s. per ton, and the difference in that one article alone, £598, is more than the difference in the cost of the cannel. As regards the price of cannel, if Alderman Wolfenden's premises were correct, his conclusions would be correct also, but, unfortunately for him, his premises are incorrect.

Alderman WOLFENDEN: I hope you will excuse me; I reason upon your own remarks.

The CHAIRMAN: Alderman Wolfenden reasons on the datum or the basis that coal and cannel are lowering. If that were true, his conclusions would be correct also. I am happy to tell him, however, that coal is not an ingredient that enters into our gas at all. We pride ourselves that we have confined the manufacture of our gas exclusively to cannel, and as I said in his hearing in my opening remarks, the cost of cannel this half year is much more in proportion to what it was in the corresponding period of last year, the company having had to give, in fact, 1s. per ton more than they did at the corresponding period of last year. If that is correct logic, gentlemen, I cannot understand it. Instead of cannel being lower, we are actually paying at the rate of 1s. per ton more for the whole of the cannel we have used this half year than we did in the corresponding period of last year. How Alderman Wolfenden could base his reasoning on the fact that cannel is lower I am at a loss to understand; and as he said cannel was the chief item to which he referred, of course his remarks fall to the ground as without force and without point. Moreover, I agree with Alderman Wolfenden as to the gas-rental. As I said at first, our sheet-anchor, the primary and legitimate article on which we have to depend, is the gas, and I hesitate not to say (and I can prove it if Alderman Wolfenden requires it) that the cannel we have used has yielded a larger proportion of cubic feet of gas per ton than it has ever done since I had anything to do with the board. Not only so, I happened to refer this morning to the quality of the gas as shown in the table I have already referred to. It is not the price of gas which determines its cheapness, but its price combined with its illuminating power. On comparing the illuminating power of the Bolton gas with former years, I find that it has had a higher illuminating power during the last twelve months than at any previous time in the history of the Bolton Gas Company; and I hope Alderman Wolfenden will be satisfied with that answer.

Alderman WOLFENDEN said he had not raised this discussion contentiously, but, judging from the tone and manner in which the chairman had replied, he (the chairman) evidently thought he had. It was for their common interest that they should arrive at the truth, and whether as private individuals, or as proprietors in the company, they could not investigate these published accounts too closely. Was he to understand that he had elicited from the chairman that, with a falling market in the price of coal, the company were under the necessity of paying a rising price for cannel? Was he to take that as the chairman's answer?

The CHAIRMAN: Not at all; quite the reverse. Knowing that Alderman Wolfenden is such a skilled debater, and so well up in financial matters, I am astonished that after I alluded to cannel being higher by 1s. per ton, and after I had told Alderman Wolfenden that coal was not an ingredient which entered into the composition of our gas—I say I am astonished that, by way of explanation, he should continue to reason that in a falling market for coal we have been paying an advanced price for cannel. Gentlemen, is that logic? I am very much obliged to Alderman Wolfenden, and I can tell him that the board will court every investigation, if they can have any light thrown on any matter whatsoever.

Alderman WOLFENDEN: Let me remind you that you said quality and price went together——

The CHAIRMAN: In order to ascertain the relative cheapness of gas; give the whole proposition. As to Alderman Wolfenden's remarks about dividing the resolution, the chairman said he thought it was not well to be too tight-laced and prevent any gentleman asking a question, though it might not be quite in harmony with the rules of debate. The incident to which Alderman Wolfenden had alluded was certainly an exception, and not the rule.

Mr. SALT: How many cubic feet of gas does one ton of cannel produce?

The CHAIRMAN: 11,000 feet, with an illuminating power equal to 20 candles; and let it be understood that our test of the illuminating power is a chemical test, and not a mechanical or photometrical one. It is a slower test, but certainly a more reliable and effective one; and it is taken by our analytical chemist at a time and place we know nothing of.

Alderman C. SKELTON said it seemed to him that had they been able to buy cannel at the same price as before, although they had had such a great loss through the falling off in the prices of coke and tar, they would have had no need to take anything from the reserve-fund at all.

The CHAIRMAN: We should have added a considerable sum to it.

Alderman SKELTON said he thought the report was very satisfactory indeed, considering there had been bad trade, for in some degree there must have been a falling off in the receipts for gas last winter, and with a revival of trade they might naturally expect that the consumption of gas would increase in proportion to the capital expended. He believed, from what he had been told, that the increase in the consumption of gas for the last twelve months had been enormous. He was connected with other large gas-works, and, from the knowledge he had of gas-making, he thought few places stood so well and got such a large quantity of gas out of the cannel as that company.

The CHAIRMAN: I will just observe that I acquit Alderman Wolfenden of anything like invidiousness or contention in remarking that I referred to the minor points and neglected the main points, but I think that had Alderman Wolfenden been a close observer of the history and progress of the Bolton Gas Company for the last few years, he would not be surprised at the large increase of our capital account. How could we have made that gasholder and tank three years ago if we had not previously purchased the land, £7000 worth of which at present yields us no return? The amount of unproductive capital may be thus represented: About £7000 worth of land in Spa Fields, £1100 worth of land in Lum Street, £1300 for mains to Astley Bridge not yet laid, £775 for retort-stack in Lum Street not yet finished, and £821 on account of a new tank in Spa Fields not yet finished, making a total of, say, £11,000, which, at 6½ per cent., is equal to £715 per annum. This property at the present moment is yielding no return, but it will be of the highest value to us as a gas company before many years elapse, and we should have been guilty of gross imprudence and want of forethought if we had not thus purchased that land, and by developing our works provided for present and future extension.

Alderman WOLFENDEN said that, as a principle, the watching small things was always important, and his observations on that score had been intended only to show that it was unnecessary for the chairman to dwell so much on the small figures at half-yearly meetings. There was not much in them, if they took the whole of the items together, as a matter of difference in the amount of revenue. Take the items of coke, tar, &c., and they had for the half year ending June, 1868, a money credit of about £2600, and for the present half year one of about £2400, so that there was only a difference of some £200.

The CHAIRMAN said that the difference in the market value of coke and tar alone made a difference on the credit side of £1048.

Alderman WOLFENDEN: Do you mean that the difference in price of the articles I have mentioned will make a difference in the revenue of £1000?

The CHAIRMAN: I say the difference in the price of coke alone would have made £450 more, and, had the tar been sold at the price of the former contract, it also would have made a difference of £598, and those two articles would have made a difference of £1048. On the debit side, I repeat, the amount paid for cannel is larger by £587 in comparison with the price paid in the corresponding half of last year; and the difference in retorts, repairs, iron and brick work, and rates and taxes, is £967; the totals of the items mentioned being £2015 10s. 2d.

Alderman WOLFENDEN said there would always be fluctuations, but he adhered to his statement that, although it was the duty of the board to watch small things, still he thought these were over dwelt upon at their meetings, whilst the totals of capital account, and the amount of rent coming in for gas, together with the cost of the gas and the cost of cannel, were not sufficiently explained.

The CHAIRMAN: Therein you and I totally differ. I have explained every item in the capital account. I said the increase in the total amount expended was £5808 18s. 3d. The called-up capital has increased since 1866 from £139,158 10s. to £161,556 10s. in 1869; and I had it in my memorandum, and was quite prepared with the answer if Alderman Wolfenden had put the question, that the difference in the three years is at least 16 per cent., and yet I have fully shown that we are perfectly justified in making the expenditure, and that we should have been guilty of the grossest imprudence and shortsightedness if we had not made it.

The motion was then put to the meeting, and carried unanimously.

The retiring directors, Messrs. T. Moscrop, W. Green, and S. Blair, were severally re-elected.

On the motion of Alderman WOLFENDEN, seconded by Alderman SKELTON, a vote of thanks was given to the chairman and directors, which having been acknowledged, the proceedings terminated.

WELL ACCIDENT NEAR ROCHDALE.—A very distressing calamity occurred last Friday near Rochdale. Some men were employed sinking a well, and one of them was lowered in a windlass, but before he reached the bottom he fell as if in a fit. Another man sent down was similarly affected, and a third man was drawn up again in an unconscious state. He recovered, but the other two when drawn to the surface were dead, death having been caused by inhaling carbonic gas, which is supposed to have accumulated during the night from an old coal-pit in the neighbourhood.

HARTLEPOOL GAS AND WATER COMPANY.

The Ordinary Annual General Meeting of the Shareholders was held at the Company's Office, West Hartlepool, on Tuesday, Aug. 31—T. R. HOLMES, Esq., in the chair.

The seal of the company having been formally affixed to the new register of shareholders, the following report of the directors was presented:—

Your directors have pleasure in reporting a considerable increase in the consumption of gas and water during the last half year.

The amount available for dividend is £2242 14s. 4d., out of which your directors recommend the payment of a dividend, for the last half year, at the rate of 6 per cent. per annum, clear of income-tax.

Your directors have to report the satisfactory progress of the Hurworth extension, and they confidently hope that the junction with the Hart reservoirs will be effected in May or June next.

By your last Act of Parliament, the maximum number of directors is fixed at six, and the minimum at three; but, owing to the vacancy occasioned by the death of the late Mr. West not having been filled up, the number holding office at present is five. Mr. West would have retired this year, along with Mr. Grey, in ordinary rotation; the latter gentleman is eligible for re-election.

Your directors must lament the death, during the last half year, of Mr. Director Crossby, and have to report that the vacancy thus caused has been filled up by the election of Mr. John Lawrenson, of Hartlepool, a gentleman whose long connexion with the company and social status eminently qualify him for the office.

The engagement for five years with the secretary, entered into in 1864, will expire on the 31st inst., and he has applied for an advance of salary. Your directors recommend that such salary be increased to £300 per annum, feeling that the additional duties and responsibility devolving on the secretary justify such advance.

The CHAIRMAN congratulated the shareholders on the favourable circumstances under which they were assembled. He was the more pleased to see them because of the cheering character of the report which the directors had now to lay before them. A copy of that report had been presented to each shareholder, and it would therefore be unnecessary to read it now. He might allude to the position of the company as a whole, but that was equally unnecessary, seeing that the report spoke for itself, and that it had such a flattering tale to relate. He would, consequently, content himself with moving:—"That the directors report and balance-sheet, submitted to the shareholders, be taken as read, and be approved and adopted, and a dividend for the last half year, at the rate of 6 per cent. per annum (clear of income-tax), upon the whole of the paid-up capital of the company, be declared, and paid at the company's office, West Hartlepool, on and after Thursday, the 9th day of September next."

Mr. WADDINGHAM seconded the motion.

The CHAIRMAN, on putting the motion, said he was very happy to tell the shareholders, if they did not gather it from the report, that the concern now carried on by the company was in an enviably prosperous condition, and was in a fair way to take up a still stronger position in the time to come. Trade had very largely improved during the past few months in West Hartlepool, and this was an earnest of future prosperity. Complaints had been made that sufficient soft water could not be obtained. That was a circumstance beyond remedy at the time; but soon the works now in course of execution would be completed, and an ample supply of water would then be brought down for manufacturing purposes. An abundant supply of spring water was already enjoyed, and the manufacture of gas was going on at an encouraging rate. He would not detain them any longer, but would request the engineer (Mr. Fenwick) to give them some information in regard to the Hurworth extension. A fortnight ago he visited the works, when he was delighted beyond measure to find them progressing in so satisfactory a manner, and he had no hesitation in saying that the pipes were all well laid.

Mr. FENWICK had pleasure in corroborating the chairman's statement. When the works were authorized at a general meeting of the shareholders, called for the purpose, he stated that 800,000 gallons per day could be obtained for the estimate then produced. After that, the directors expressed a strong wish that the supply should not be diminished, but extended as far as practicable; and, acting on that hint, they proceeded with the undertaking, until fully a million gallons per day could be guaranteed, and there could be no want of water. The tests made in the driest part of the summer gave upwards of 300,000 gallons at the Hurworth Burn; and in winter the supply would be much more than enough, so that constantly there would be an average sufficient to keep the reservoir filled all the year round. The works were now in process of completion. Instead of making a temporary dam at the burn, which was first contemplated, they had decided to complete the works entirely, only hoping that the result would prove generally satisfactory. To show the importance of providing adequate facilities for bringing down the water supply, he might state that there had been an increase in the water consumed during the past five years of quite 60 per cent. In 1864 it was at the rate of 206 million gallons per annum, and during the past twelve months it was 345 millions, being just an increase of 60 per cent.; and that increase was going on still in the same ratio. As manufactories sprung up the demand would become greater, and they would soon find that the supply of water was in no degree excessive, but that in the course of some ten or a dozen years, the public requirements will more than have justified the extension of the company's resources.

Mr. WADDINGHAM appealed to Mr. Fenwick, as a practical man, to state definitely, for the information of the shareholders, when the supply was likely to be had.

Mr. FENWICK said there were reasons why they should not push on all the works at the same time, on the ground of economy, seeing that it was of the highest importance that the works, as they progressed, should be subject to inspection by their own duly authorized inspector. If they started all the contracts at once, the pipes would not be laid so expeditiously, and perhaps not so well; and they preferred to proceed cautiously. By the month of May next they might expect the new supply. The directors had given notice to the contractor that he would be held to his conditions.

The SECRETARY: I think the date fixed is about the latter part of March.

Mr. THOMPSON said he had the pleasure of accompanying Messrs. Grey and Lawrenson, a few weeks ago, to the Hurworth Burn, and he was particularly pleased to see such a fine stream of water as there is. He had no doubt it would answer every expectation, not only in wet weather but in dry. The stream was sufficient to fill pipes large enough to pass his body.

The CHAIRMAN said it was unquestionably the wish of the directors that the water should be brought down as soon as possible.

The motion was then put, and carried unanimously.

The CHAIRMAN moved that Mr. J. Grey be re-elected a director of the company. They would have gathered from the report that the vacancy created by the lamented decease of Mr. West, his predecessor in office, had not been filled. The reason the directors had taken no action was because they considered five members of the directorate sufficient to carry on the concern. They had lost another director in the late Mr. Crossby, of Sunderland, whose death was the subject of universal regret. The vacancy thus caused had been filled up by J. Lawrenson, Esq., who had been connected with the company from the first, and had evinced his deep interest in the company's welfare in more than one way. He could not omit to mention the untiring energy and tact displayed by Mr. Grey from the commencement, than whom none had worked harder.

The motion being seconded by Mr. WADDINGHAM, was carried unanimously.

Mr. GREY acknowledged his re-election in suitable terms. Up to the present he felt he had done his best to further the interests of the shareholders; and if he could do anything to promote those interests further, his services were freely at their disposal.

It was moved by the CHAIRMAN, seconded by Mr. THOMPSON, and carried, that Mr. Henry Taylor and Mr. William Richardson be re-appointed auditors for the ensuing year.

Mr. LAWRENSON said, having recently been appointed a director, he might be permitted a few observations. He was not egotistical when he declared that the Hartlepool Gas and Water Company was the child of his own creation, and that he had, father-like, watched its upward growth with interest until the present time; and it had grown in size in a most wonderful way. During a long life, like his, many changes and vicissitudes occurred. They would remember, probably, that it once took as many days to reach the metropolis of this country as it now occupies hours—when such an undertaking was considered quite an event in a man's lifetime. The old family blunderbuss must be cleaned, and the lock greased; a pair of long stockings and a night-cap must be taken, and guineas ingeniously covered to make them look like buttons. But in these days of steam, railways, electricity, and iron, it was otherwise. In 1864 Hartlepool began to increase in population. It was also notorious for its dirt and want of light, and more particularly for its want of water. Go back in spirit with him some twenty-five or thirty years ago, and picture to themselves a cold and bleak winter's day. A boy returns from school, and is told to hurry away for a pail of water. "Oh my!" says the lad, "there is such a crowd round the pump, I can't get near." An enterprising old man, with a wonderful donkey, comes upon the scene with bell in hand, to give notice that fine Stranton water can be had from his barrel at a halfpenny per pail. Just 17s. 4½d. was thus spent per annum for a supply of water in those "good old days!" But some genius of those times resolved to obtain a better and a cheaper supply. An Act of Parliament was got, and he had the honour to accompany his friends, Mr. Grey and Mr. Turnbull, to London on that occasion. A company was formed, with a capital of £18,000. In 1849 that capital was increased to £34,000; in 1855 it reached £100,000; and since then the company had gone on increasing in its works and in its capital, until that capital now amounted to £150,000. Hartlepool was now improved for the better; proverbial for its cleanliness, and well lighted with gas; and any man can now obtain an ample supply of water and gas at a minimum rate of 3s. per annum. These charges were of no trivial importance. Instead of the halfpenny per pail of water, they could get that water at a far cheaper rate, and in an unstinted quantity. The public streets were well cared for, cleaned, and lighted; no longer dependent on the Will-o'-the-Wisps of poor broken-down watchmen. He was glad to know that the directors of the Hartlepool Gas and Water Company had always worked quietly and unobtrusively together, and their labours had proved eminently satisfactory. Shares were eagerly caught up, and readily bought, and a prosperous future was before them. He thanked them for having elected him to the responsible post of director; and he promised to do his best—the best could do no more. For his own part, he preferred always to be served by a man who performed more that he promised, rather than by a man who promised more than he performed. They had lost two valuable men by death, under whose direction the affairs of the company had prospered. They did what they did conscientiously; and he hoped they would be able to say the same of him, when he, too, had passed away.

Mr. THOMPSON could bear testimony to the truth of Mr. Lawrenson's remarks. The company was fixed on a sound basis, and was a steady-going concern. It would have been well if the same could be said of many of the bubbles which he had seen burst in their midst.

The CHAIRMAN added that, without the water which the company supplied, Hartlepool would ere long have been poisoned. It was now his pleasing duty to move—"That, having regard to the increased work and responsibility which now devolves upon the secretary, and to the fact that the term of engagement with the company, entered into five years ago, is now to expire, his salary be and is hereby increased to £300 per annum." [The amount hitherto paid as salary to the secretary was £200 per annum.] The chairman remarked that the increase was very large, but the secretary had done extra labour, and his duties had now nearly doubled, as compared with his work at the time he was appointed to the office. He had had a private conversation with the auditors, who agreed that a more worthy official they never met with. His books were kept in an unexceptionable manner, and in every way he had gained titles to increased reward.

Mr. LAWRENSON had great pleasure in seconding the motion.

Mr. THOMPSON said to some persons the amount of increase might seem large, but recommended as it was by the board of directors, he would be a bold shareholder who offered to oppose. The money thus paid away in the salary of their worthy official was neither lost nor wasted, and they all knew, he believed, when they had a good man. Mr. Trewhitt was a gentleman with whom he was acquainted from the beginning, and he had taken some part in installing him in his present situation, and he had never regretted it. He was trustworthy, industrious, and active, and all that the company could either wish or expect.

Mr. TURNBULL: Mr. Trewhitt is undoubtedly a most valuable servant.

Mr. FENWICK: Having, with your late chairman, associated very closely with your secretary, in my professional capacity, I have had a most excellent opportunity of watching his conduct, and of estimating his character. His abilities are of a very high order; indeed, of the highest order. A man of unblemished honour and strictest integrity, the voice of suspicion could never be raised against him. In the time of defaulting secretaries and treasurers, this was a matter of pride; and he would be a bold man who would say nay to the directors proposal. For seventeen years Mr. Trewhitt has been a shareholder; for eleven secretary to the company. Since then his duties have doubled, the sale of water and gas has nearly doubled, and his increasing responsibilities should win increasing remuneration. The best regulated companies recognize the importance of giving liberal salaries to their responsible officers, whilst parsimony in such matters is the very worst economy. In granting the present increase you are not only rendering to Mr. Trewhitt his deserts, but consulting the interests of the shareholders. I have great pleasure in supporting the proposal, and am only too happy of having an opportunity of adding my humble testimony to the high character Mr. Trewhitt bears in this town.

The resolution was put, and carried unanimously.

The SECRETARY begged to thank the meeting for this substantial mark

of their approbation, and for the kindly remarks made in his behalf. It had been ever his study to promote the good of all concerned, and he was sure they would have no cause to regret their decision.

On the motion of Mr. TURNBULL, seconded by Mr. THOMPSON, a cordial vote of thanks was passed to the chairman for his efficient services in the chair; after which the meeting terminated.

SUPPLY OF GAS TO SOUTHPORT.

A Special Meeting of the Southport Town Council was held on Tuesday, Sept. 7—the MAYOR (Alderman Boothroyd) in the chair—for the purpose of considering a motion of which notice had been given, to the effect (*inter alia*): "That in the opinion of this meeting it is expedient that a bill be promoted in the next session of Parliament to enable the council to manufacture and store gas for the district of Southport on a site other than the land and works in Eastbank Street, and to obtain borrowing powers for that purpose; and that the town-clerk be and he is hereby instructed to give the necessary notices and take all other steps requisite for promoting a bill to embrace the foregoing objects during the ensuing session of Parliament."

Councillor BARROW, in submitting the motion, said it would be borne in mind that at the previous meeting of the council it was shown that, when they took into consideration the value of the land and property at the Eastbank Street site of the gas-works, and likewise the money saved in carriage and cartage at the end of ten years—the period fixed in the estimates brought forward by the Gas Committee—there would be a considerable saving to the town by having extramural gas-works; and, as it appeared that the council had no power to go elsewhere than the present site, while, in accordance with the reports of the professional men who had investigated the matter, it had been decided by the council that it was absolutely necessary for the requisite supply of gas to the town that very extensive additions should be made to the plant now in existence; and, inasmuch as the Act of Parliament of 1865 gave no power to erect gas-works otherwise than on the present site, it seemed imperative that they should obtain the requisite powers, if it should be decided necessary to erect additional gas-works out of the town. Before a new Act could be obtained certain notices were necessary, and no time should be lost; hence he had taken the liberty to bring the matter before the council that evening. If his motion were passed they would not be placed in such a position that they could not recede if it was considered unnecessary to obtain these further powers; and, inasmuch as it would be unwise to go to Parliament for only one object while other powers were required, he had included in his resolution other matters which he deemed of importance to the interests of the town. Since notice of motion had been given, the town-clerk had ascertained that the borrowing powers for which they applied some time since did not authorize the raising of money for gas purposes. He would not enter into the merits of the gas question itself, inasmuch as the council had appointed a committee for the further investigation of the subject, and it would be uncourteous to further allude to it until the committee had given in their report. He might say he believed that, should they find it necessary to proceed with this notice of motion to its consummation, an arrangement might be made with the lords of the manor in connexion with the land required for new gas-works.

Councillor STANLEY seconded the motion, in order to bring the subject before the meeting.

Alderman GREGSON moved as an amendment—"That in the opinion of this council it is expedient that a bill be promoted in the next session of Parliament, to embrace (*inter alia*) the following public objects—viz., to enable the council to manufacture and store gas to meet the present and future wants of the district of Southport, to acquire lands, and to obtain increased borrowing powers for that purpose—and that the town-clerk be and he is hereby instructed to give the necessary notices, and take all other steps requisite for promoting a bill to embrace the foregoing objects during the ensuing session of Parliament." He said it certainly did seem strange that any member of the council should have taken it upon himself to bring a subject of this importance before them unasked and unaided by a committee. An application to Parliament for a new bill had generally been considered a matter of such importance as to engage the attention of the whole body corporate of the town. When this notice of motion was received many of the council could not help discussing the question. They had no secrets, and he might state that the Gas Committee and other members of the council interested had met to consider what was best to be done under the circumstances. Now, though the amendment which he had just moved went to show that they proposed to go to Parliament for certain powers, he hoped and trusted there would be no necessity for doing anything of the sort. Indeed, he scarcely thought there would; but, as that was the last day for a meeting for this purpose, it was thought desirable that the council should put themselves in a position to go to Parliament for these objects, should such a course be deemed necessary. It was no secret that, under the Local Government Act, they could not obtain borrowing powers for the extension of the gas-works either on the present or any other site, and therefore it was absolutely necessary that they should obtain money from some other source. He hoped and trusted there was another method besides going to Parliament by which to obtain borrowing powers for the extension of the gas-works. Councillor Barrow seemed to have taken it for granted that the council were not going to continue the manufacture of gas on the site of the present works, and that they had already made up their minds to manufacture gas out of the town.

Councillor BARROW: No, no.

Alderman GREGSON said that as the original resolution was framed, it prohibited the council from extending the gas-works on the present site, and therefore he contended that Councillor Barrow had taken a one-sided view of this question, altogether unworthy of a member of the council so long as a committee was at work on the subject. He was sure none of the members of the council were so blind as to determine that, whatever might be the recommendation of the committee referred to, the gas-works should be extended on the present site. He maintained that there was not a single member of the council who would not be perfectly willing for the gas-works to go out of the town if it was shown that such a change would be for the interest of the place, and that it could be carried out without entailing any great burden on the ratepayers. The amendment enabled the council either to extend the gas-works on their present site, or to erect them outside the town, and this he thought was the position in which the council ought to be placed.

Dr. WOOD seconded the amendment.

Councillor SMITH asked Alderman Gregson as to the other mode, referred to by him, of obtaining money for gas-works extension, besides going to Parliament for it.

Alderman GREGSON believed that, under the Municipal Act, they had power to memorialize the Lords of the Treasury for power to borrow the money.

Councillor SMITH hoped they would find ways and means to get money for gas extension without the trouble of going to London. If they went to Parliament probably there would be opposition.

Councillor HOUGHTON thought all would agree that it was best to be quite safe. The question had been put to the town-clerk, and he (Councillor Houghton) understood there would be no difficulty in getting the money from the Lords of the Treasury——

The TOWN-CLERK: If they do not decline to grant it.

Councillor HOUGHTON observed that, though this was the last day in which they could take preliminary action with a view to obtaining an Act of Parliament, the council would have a month in which to consider the matter, and the action taken that evening would not pledge them to any particular course. It would only put them in a proper position. He thought Councillor Barrow would agree that it would be paying greater deference and respect to the four gentlemen appointed by the council, in reference to the gas question, to hear what they had to say, before deciding as to the removal of the gas-works. If it could be shown that the financial position of the town would not be made worse by such removal, he would vote heartily for it.

The MAYOR said that by passing the amendment he thought Councillor Barrow's object would be fully secured. The amendment did not fix the absolute removal of the gas-works, but it did not prohibit such removal; and if the money could be borrowed in the way indicated by the town-clerk, he was sure all would rejoice that it was not necessary further to go to Parliament, for he would not like to see the lobby of the House of Lords and Commons again. But, if they could not get the money in any other way, it would be wise to pass either the resolution or the amendment now before them. They would have a month for consideration, as well as an opportunity to investigate the whole of the gas question, with the help of the two engineers appointed; and he trusted that the report which the committee would present on this subject would be of such a character as to indicate to every calm and dispassionate mind the right course which ought to be pursued. This being the case, if in the meantime the town-clerk succeeded in obtaining information how the money could be borrowed for gas-works extension, when they came to meet again at the end of a month, to confirm or otherwise the resolutions passed at the present meeting, they would be in a better position to decide as to the wisest course to be adopted.

The TOWN-CLERK read the 8th clause of the Municipal Corporations Amendment Act, 23 and 24 Vict., cap. 16, which enables a corporation to apply to the Lords of the Treasury for power to borrow money for public works.

Councillor BARROW, in replying to the other speakers, said he would like the council to be unanimous in their vote on the subject before them. He had no wish to go to the House of Commons at all; if they could do without that it would be all the better. He thought the amendment which Alderman Gregson had proposed fully justified him (Councillor Barrow) in the course which he had taken, and he did not think that Alderman Gregson ought to have made the reflections which he did make at the commencement of his speech. Now it was objected that the first clause in the original resolution bound the committee to only one course. But Alderman Gregson, in taking that objection, was most decidedly talking off the book, for he ought to know that the Act of 1865, as well as previous Acts, gave the council power to manufacture on the site of the present gas-works, and it would therefore be perfectly ridiculous to go to the House of Commons to obtain powers which they already possessed.

Alderman GREGSON: Have we power so to use the slaughter-house land?

Councillor BARROW: I said on the present site.

After some further conversation the amendment was put to the vote, and carried.

Alderman GREGSON then moved—"That the borrowing powers for all the purposes of the borough be included in the proposed bill, inasmuch as it is found that the Home Office has no authority to authorize the corporation to borrow money for all the requirements of the borough; and that the aggregate amount to be borrowed, for all purposes, do not exceed two years assessable value."

Alderman HOLT seconded the motion.

Councillor BARROW objected to this resolution, as he considered it was very important that the borrowing of money should be restricted by the Secretary of State, as was the case under the Local Government Act. He considered, too, that this resolution was not in order, according to the terms of the notice calling the meeting.

The TOWN-CLERK read the 69th section of the Municipal Act, to show that the motion was in order.

Councillor SMITH thought it strange that this resolution should be brought forward. It seemed as if it had been made up to go to Parliament. He had never heard of it before.

The MAYOR read the following communication from the Local Government Office:—

Local Government Act Office, 8, Richmond Terrace, Whitehall, S.W., Aug. 23, 1869.

Sir,—I am directed by Mr. Secretary Bruce to acknowledge the receipt of your letter of the 14th inst., as to the power of the Home Secretary, under the provisional order of the 23rd of June, 1869, to grant borrowing powers to the Town Council of Southport for extension of their gas-works.

I am to state that the increased borrowing powers were granted not for all purposes, but only for purposes under the Local Government Acts—gas-works not being one of such purposes.—I am, sir, your obedient servant, J. MONTAGUE.

K. Walton, Esq., town-clerk, Southport.

Councillor SMITH added that he was sure, if they thus went to Parliament for powers to borrow some £200,000, it would raise opposition.

The motion was put and carried, with two dissentients.

COST OF THE OPPOSITION TO THE CITY GAS COMPANIES.—According to the Chamberlain's accounts, recently issued, it appears that the expenditure of the corporation for the year 1868, in opposing the City gas companies in Parliament, was £8043 6s. 8d.

SHEFFIELD UNITED GAS COMPANY.—The accounts of this company for the half year ending June 30 show a net profit of £20,046 1s. 10d. Of this, £15,884 17s. is appropriated to the payment of the maximum dividend, leaving £4161 4s. 10d. to be carried to the reserve-fund. This will bring the reserve-fund to £34,589—a fraction over the maximum amount allowed by the Act of Parliament, which stipulates that it shall not exceed one-tenth of the capital. The capital being £344,053, the reserve-fund cannot exceed £34,405, and any profits made hereafter beyond the sum required for the payment of the maximum dividend must accordingly go in reduction of the price of gas to the consumers, who may, therefore, not unreasonably look for cheaper gas before long; though it must be remembered that the results above indicated are produced by a charge of 3s. 6d. per 1000, whereas the price for the current half year has been reduced to 3s. 3d. per 1000. The accounts show a rather large apparent expenditure on capital account; it is, however, only apparent, being simply the result of a temporary expenditure which will be fully refunded.

ON THE PROPOSED SUBSTITUTION OF GAS FOR OIL AS AN ILLUMINATING POWER IN LIGHTHOUSES.

REPORT TO THE BOARD OF TRADE BY PROFESSOR TYNDALL, F.R.S.

SECTION 1.

Royal Institution, June 29, 1869.

Sir,—I read with attention the reports and appendices submitted by the Commissioners of Irish Lights to the Board of Trade regarding the employment of gas for lighthouse purposes, as illustrated in the lighthouses of Howth Baily and of Wicklow Head.

With the view of ascertaining by personal inspection the merits of this new system of illumination, I have visited the establishments referred to, and by a series of measurements and observations, conducted during several successive days and nights, established the facts and came to the conclusions embodied in the following report.

With a view of checking the observations, I availed myself of the services of Mr. Valentin, the principal assistant in the Royal College of Chemistry—a gentleman of great experience both in the chemistry of gas and in the practice of photometry. On Saturday, the 5th of June, Mr. Valentin, at my request, executed at Howth Baily a series of experiments in which the illuminating power of the gas-flame was compared with that of the most powerful oil-lamp employed by the Commissioners of Irish Lights.

This lamp consists of four concentric wicks, which give rise to four concentric cylinders of flame, the interior flames radiating their light through the exterior ones. A greater body of light is thus sent forth than could possibly be obtained from a single wick. Such a 4-wick lamp was placed in a dark room, and by means of a Bunsen's photometer 36 feet long was compared with the gaslight now employed at Howth Baily.

The gas-burner, devised and constructed by Mr. Wigham, consists of a series of concentric fishtail jets. The three central rings embrace a group of 28 jets, and this is the light employed under ordinary circumstances at Howth Baily. To this central group can be added in succession four other circles of burners, each embracing 20 jets. Thus the lowest light employed is emitted by 28 jets, the next in power by 48, the next by 68, the next by 88, and the next by 108 jets of gas. It is possible, therefore, to employ lights of five different powers.

The following tabular statement exhibits the results obtained by Mr. Valentin. In all cases the 4-wick oil-lamp is taken as the unit, and the illuminating power of the gas-flame is expressed in terms of that unit.

4-wick Lamps.		Gas-Flame.		Number of Jets.
1	....	2½	....	28
1	....	4¼	....	48
1	....	7¼	....	68
1	....	9¾	....	88
1	....	13	....	108

The superiority of the gas over the oil-flame is rendered very conspicuous by these experiments. The 28-jet burner possesses 2½ times, the 48-jet burner 4¼ times, the 68-jet burner 7¼ times, the 88-jet burner 9¾ times, and the 108-jet burner 13 times the illuminating power of the 4-wick flame.

On Saturday evening, the 5th of June, I reached Dublin, and proceeded immediately to the Howth Baily Lighthouse. The experimenters who had been employed there during the day had departed, and my arrival was unexpected by the keeper. The 28-jet burner was in action, and the light it emitted appeared to be a very fine one. I caused the keeper to pass to the 48-jet and the 68-jet burners in succession. The ease with which he did so convinced me that complete practical mastery over the apparatus, if not already attained, is certainly attainable.

On Monday, the 7th of June, I accompanied Captain Roberts and Mr. Wigham to Howth Baily, and there executed with the same lights the series of measurements which had been carried out by Mr. Valentin on the previous Saturday. With one exception I found his results to be sensibly correct. The exception occurred in the case of the 68-jet burner, which Mr. Valentin made 7¼ times, and which I made a little over 6 times the power of the 4-wick lamp. The difference was no doubt due to a temporary change in the light of the oil-lamp.

It is difficult to make the intensity of a light an object of memory, but it sometimes appeared to me that the oil-flame at Howth Baily did not quite equal in intensity the flame of the 4-wick lamp which I have sometimes operated on at the Trinity House. But, taking everything into account, I think it may be safely affirmed that the results embodied in the report submitted by the Irish Light Commissioners to the Board of Trade are not exaggerated.

When the larger burners were employed the powerful rush of the flame into its mica chimney, and the body of radiant heat emitted, at first startled me. Further investigation satisfied me that all the powers of the burners were perfectly under the control of the keeper.

I could discover no defect in the dioptric apparatus arising from this heat, nor do I anticipate that any damage is likely to arise from it.

SECTION 2.

I have thus far limited myself to the observations made at the lighthouse. But the atmosphere itself, through which the light has to pass to assist the mariner, is the best photometer. I accordingly arranged with Captain Roberts and Mr. Wigham a programme of observations from a distant position. The place chosen, which had been previously employed for similar observations, was a point on the North Wall, near Dublin, about six miles distant from the Howth Baily Lighthouse.

The observations began at 40 minutes past 9 p.m. on the 7th of June. The 28-jet burner, embracing the three central rings, was first compared with the oil-flame. The superiority of the gas was strikingly manifest. The fourth, fifth, sixth, and seventh rings of burners were successively added, an interval of seven minutes being allowed for the observation of each. The oil-flame became relatively more and more eclipsed, and, when the full energy of the gas was invoked, its light would, in common language, be pronounced incomparably more powerful than that of the oil.

And, in fact, this language would be scientifically correct as applied to one of the experiments, in which two layers of calico, the one oiled and the other not, together with a sheet of muffled glass, were placed in front of the two lights. This arrangement roughly represents a fog. The oil-light was completely extinguished, while the gas continued to be distinctly visible. The full power of the gas-burner was here employed, 108 jets being ignited.

No doubt could rest upon the mind that, at the point of observation chosen, the gas-flame from first to last was superior to the oil-flame, being with the higher powers of the gas-burner *exceedingly superior*. I did not, however, think it safe to limit myself to this particular point of observation; and, to meet my wishes, Captain Roberts was good enough to engage a steamer, which enabled me to proceed down the river, and to pass across it from side to side between the North Wall and the South Wall, thus varying the point of observation. It soon became manifest that the oil-flame at Howth Baily varied in intensity with our position, and that the direction of *minimum* intensity corresponded almost exactly with that in which our observations had been made on the previous evening from the North Wall.

No safe conclusion, therefore, could be drawn from the observations made on the evening of the 7th, for it was manifest that some cause existed which prevented the oil-lamp from displaying its full power in the direction of the North Wall, thus giving the gas a relative superiority which in reality it did not possess.

It is to be borne in mind that the oil-lamp in these experiments was placed in the first order dioptric apparatus of the lighthouse, the apparatus being, as usual, surrounded by its glazed lantern. The gas-flame, on the contrary, was placed in a temporary hut at some distance below the lantern. A refracting panel, similar in all respects to those of the dioptric apparatus, was placed at the proper distance in front of the gas-flame, and, to make the conditions alike, the upper and lower reflecting prisms of the apparatus were shut off. It was, therefore, the lights transmitted through the two lenticular belts that were compared together.

In company with Captain Roberts, I again visited Howth Baily on Wednesday, the 9th. We were preceded by Captain Hawes and Mr. Wigham, who were instructed to examine with all care whether any obstruction was offered by the lantern to the passage of the light towards our station on the North Wall. *It was soon found that one of the vertical sashes of the lantern was directly interposed between the light and our point of observation, and that to this obstruction the enormous apparent superiority of the gas-flame over the oil, manifested on the evening of the 7th, was to be ascribed.* A very obvious inadvertence, I may add, led Captain Roberts to the choice of the North Wall as a station.

Another line of observation had, therefore, to be chosen, and that between Howth Baily and Poolbeg Lighthouse appeared free from objection. The refracting panel placed in front of the gas-flame was shifted to suit this new line, Captain Roberts, Mr. Wigham, and myself returned to Dublin, and steamed from the North Wall to Poolbeg. Captain Hawes remained at Howth Baily to see that the oil-flame was maintained at its maximum brilliancy. In short, every precaution was taken to show the oil-lamp fair play.

The oil-lamp was lighted at sunset, and when observed from Poolbeg, a little after 9 p.m., it showed a very brilliant light. At 9.40 the 28-jet gas-burner was ignited, when the wisdom of our previous scrutiny became at once manifest. *From the new station it was impossible to say which of the lights was best.* Captain Roberts, Mr. Wigham, and myself were unanimous upon this point.

At 9.50 an oiled calico screen was placed in front of each light; the gas-flame had slightly the advantage over the oil in penetrative power. The same feeble superiority was manifested when an additional screen of dry calico and sheet of muffled glass were added to the first.

At 10 p.m. we passed from the 28-jet to the 68-jet burner. The decided superiority of the gas-flame was immediately apparent; it exhibited a very brilliant globe of light.

At 10.10 the 6th and 7th rings of the burner were added, 108 jets being now employed. The light was truly splendid; the oil-flame, which, when burning alone, shone brilliantly, appeared to shrink and pale before the flame of the 108-jet burner.*

SECTION 3.

There is a manifest discrepancy between the measurements with Bunsen's photometer and the observations from Poolbeg. The former assign to the 28-jet gas-flame 2½ times the illuminating power of the oil-flame, while, to an eye placed at Poolbeg, the lights appear equally intense.

The discrepancy may be in part due to the better draught, and consequent brisker combustion of the oil in the lantern of the dioptric apparatus; or it may be due to a portion of the gas-flame being out of focus. Indeed, Mr. Wigham has since found that the focussing of the gas-flame was imperfect. The 28-jet burner consumes 50 cubic feet of gas per hour. Capt. Roberts and Mr. Wigham have found, by photometric measurement, that a consumption of 33 feet per hour produces a light fully equal to that of the 4-wick lamp, and that this light, when properly placed within the dioptric apparatus, maintains its equality from all points of observation. I have no reason to doubt, but very strong reason to accept as correct, this result, which has been recently communicated to me by Mr. Wigham.

SECTION 4.

The coal employed for the manufacture of the Howth Baily gas is a Scotch cannel, called Stockwell cannel. It is delivered at Howth at a cost of 35s. a ton. It yields an exceedingly rich gas. A fishtail flame of London gas is equivalent to 12 sperm candles, while the flame of the Howth Baily gas is equivalent to 38 such candles. The retorts containing the cannel are heated with Ayrshire coal, which is delivered at Howth at 22s. a ton, and with the coke of previous charges. Thus an 8-stone charge of cannel coal is distilled off at an expense of 10 stones of Ayrshire coal, together with the coke left by a previous 8-stone charge of cannel. This proportion between the cannel distilled and the fuel employed in distilling it is quite exceptional. With further practice a less amount of fuel will probably be found sufficient.

From data collected for me with all possible care by Mr. Valentin, I infer that 10,000 cubic feet of 38-candle gas are manufactured at a cost for raw material alone of £3 2s. 7½d. Taking the expenses of purification, labour, and renewal of retorts and furnaces at 50 per cent. additional, which, according to my data, is a close approximation to the truth, the total cost of the production of 10,000 cubic feet of Howth Baily gas is, in round numbers, £5, or 10s. per 1000 cubic feet.

Assuming the number of hours of illumination in a year to be 3780, the first power of Mr. Wigham's burner, which consumes 50 cubic feet per hour, would require per annum 189,000 cubic feet of gas, which, at a cost of 10s. per 1000 cubic feet, would amount to . . . . . £94·5

The second power of the burner, which consumes 105 cubic feet per hour, would consume annually 396,900 cubic feet of gas, at a cost of . . . . . £198·45

The third power, which consumes 148 cubic feet per hour, would consume in a year 559,440 cubic feet, at a cost of . . . £279·7

These sums do not include the interest on the original outlay. Taking that outlay at £800, and allowing 4 per cent. interest, £32 will have to be added to each of the foregoing sums. This would make the annual cost of the respective burners:—

Power I.	£126·5
Power II.	£230·0
Power III.	£311·0

* Since my return to London, Captain Roberts, at my request, placed the gas-flame in the dioptric apparatus and the oil-flame in the hut below. From the North Wall the oil-flame was brightest; thus affording additional evidence, if such were needed, as to the influence of the obstruction offered by the sash of the lantern.

It is the first of these powers—the "Standing Order burner"—that ought to be compared with the oil-lamp. Taking the annual consumption of oil at 800 gallons, and the price at 3s. 10½d. per gallon, being the average of all the prices paid at Howth Baily during the last five years, the cost of the 4-wick lamp for oil alone would be £155. Adding to this £13 for wicks, cylinders, and burners, we have the total annual cost of the 4-wick lamp, £168. A clear annual saving of £41 5s., therefore, accrues from the employment of the gas.

Assuming the result communicated to me by Mr. Wigham to be correct, that a consumption of 33 feet per hour yields a light equal to that of the 4-wick lamp, an additional annual saving of £32·13 would be effected by the employment of this lower power; making a total saving of £73·63. In fact, with this low power, which Mr. Wigham proposes to call "the equality burner," the annual expenditure would be £94·37, as contrasted with £168 for the 4-wick lamp.

As already stated, the data on which this conclusion is founded are the best I could obtain. Relying on the figures as to expenditure furnished in Dublin, I think the result may be regarded as a close approximation to the truth.

But besides the advantage of greater cheapness, the great increase of illuminating power which the employment of gas places at the disposal of the keeper on foggy nights is a consideration of the very highest importance. This power is not drawn upon until it is needed, and it is then evoked in a moment of time. In connexion with this point, I would strongly recommend the continued comparison of the oil-flame with the higher powers of the composite burners in foggy weather. Such observations would yield results of far greater practical value and significance than those obtained with an ordinary photometer.

Whether gas can be profitably applied in any particular lighthouse or not, must depend upon the locality. In rock lighthouses it would be out of the question. But there are, doubtless, various important points upon our coasts where its introduction would not be difficult. I do not think that either the manufacture of the gas or the construction of the burner has, at present, reached its maximum perfection, and, with a view of attaining this perfection, and of extending the basis of our induction, I would venture to recommend to the board the further encouragement of this system of illumination *in Ireland*.

SECTION 5.

The observations and remarks regarding the Howth Baily light have been permitted to follow each other without interruption; I, however, snatched a day (the 8th of June) from them to visit the lighthouse at Wicklow Head. The light here is also produced from gas. It is an intermittent light, being rendered so by a machine which cuts off at intervals the main supply, leaving open a byway which is barely sufficient to keep the tips of the flames alight. The apparatus when wound up is self-acting, and it appears to do its work admirably. The intervals of darkness are of three seconds, during which there is no waste of light, and the luminous intervals of ten seconds duration. The light is cut off with exceeding promptness, the dark intervals being sharply separated from the light ones.

Throughout the observations, both at Howth Baily and at Wicklow Head, I was much struck with the perfect mastery of the keepers over the apparatus entrusted to them.

Nor can I omit to mention the promptness and the skill with which I was seconded by both Captain Roberts and Mr. Wigham. My suggestions were attended to, my requests complied with, and my instructions carried out with fidelity and cheerful despatch. To both these gentlemen I feel personally indebted, as also to the Commissioners of Irish Lights, for their courteous interpretation of my wishes regarding the mode of observation.

I have, &c., (Signed) JOHN TYNDALL.

T. H. Farrer, Esq., Secretary to the Board of Trade.

PROPOSED PURCHASE OF THE SHEFFIELD GAS-WORKS BY THE CORPORATION.

REPORT OF THE NOMINEE DIRECTORS.

At the July Meeting of the Town Council of Sheffield, a discussion took place with reference to the financial position and management of the gas company. At the conclusion of the discussion the following resolution was passed:—"That the nominee gas directors (Alderman Saunders, Mr. Hallam, and Mr. Roberts) be requested to report as to the management, especially financial, of the Sheffield United Gaslight Company; and as to the advantages, if any, likely to arise to the public by such company being purchased by and placed under the control of the Town Council." The nominee directors have just presented their report, which is a voluminous document, and is worthy of attentive consideration. The following are the principal features:—

Origin and Position of the Company.

The Sheffield United Gaslight Company is formed of three separate companies. The first, called the Sheffield Gaslight Company, 1818, with a capital of £40,000; the New Gas Company, 1835, with a capital of £80,000, amalgamated in 1844, with a capital of £135,000, and power to borrow on mortgage £45,000; and the third, called the Sheffield Gas Consumers Company, 1850, with a capital of £60,000; this last company amalgamating with the united companies in 1855, the capital being £264,984, and borrowing powers amounting to £80,000, or a total of £344,984. The present paid-up capital of the company amounts to £330,875 5s., with £13,178 5s. yet to call, making a total capital, under the Act of 1855, of £344,053 10s., the whole called-up capital paying the maximum dividend of 10 per cent. There is also a reserve-fund of £30,428 10s. 1d. created out of the profits; £23,500 of this fund is lent on mortgage at 4½ per cent., and £6928 10s. 1d. remains in the bank, producing about 4 per cent. The company at the present time owe on borrowed money £16,700, a large amount of the mortgaged debt having been paid off under powers secured for that purpose. By the absorption of the Gas Consumers Company, in 1855, all competition was removed, but an increased capital created, amounting to £60,000. This additional capital has never produced one halfpenny in return, but remains as a dead-weight upon the company, and is an actual loss to the gas consumers. By the Act of 1866 the company have the power of raising an additional share capital of £350,000, and to borrow on mortgage £173,500, making a total of £523,500, which when raised will form, with the present capital, £344,053 10s., a total of £807,553 10s., or a share capital of £694,053 10s. The new share capital will at once, when raised, bear interest at 7 per cent., and ultimately 10 per cent.

Character of the Works.

There are three sets of works belonging to the company, and a fourth is in course of formation. These works are at Neepsend, Effingham Street, Shude Hill, and the one in course of erection at Brightside. The works at Neepsend, originally belonging to the Gas Consumers Company, now greatly enlarged, are efficient in every way, having 570 retorts and two gasholders for storing 2 million cubic feet of gas. These works are capable of yet greater extension, and, indeed, are amply sufficient for the purpose of supplying Sheffield for many years. The Effingham Street works are of considerable extent, have 250 retorts and four gasholders for storing about 1,200,000 cubic feet of gas; there is also room for double the number of retorts and at least two more large gasholders, doubling the present storeage. There is likewise a gasholder in Earl Street for storing about 500,000 cubic feet of gas. The works in Shude Hill, with the exception of the offices and repair and store rooms, are not at present in use. At Brightside the works are in the early stage of formation. The principal mains through the town are of a large size, acting as storeage-pipes, being quite beyond the requirements of supply. The report here gives a table showing the consumption of gas, the number of retorts, and the storeage in a number of towns as compared with Sheffield. Manchester has the largest consumption of the towns given—namely, 1,246,892,000 feet. The retorts there number 1206, and the storeage is 4,500,000. The consumption in Sheffield is 500 million feet; the retorts are 820 in number, and the storeage is 3,200,000 feet.

Price of Gas.

The present price of gas in Sheffield to the general consumer is 3s. 3d. per 1000 cubic feet, with a charge of 10 per cent. for meter-rent—the maximum charge by the Act of 1855 being 4s. Taking a number of towns, the price of gas as compared with Sheffield is found as follows:—Sheffield, 3s. 3d.; Ashton, 3s. 2d.; Bury, 3s. 4d.; Salford, 3s. 4d.; Manchester, 3s. 2d.; Stockport, 3s.; Liverpool United, 3s.; Dudley, 3s.; Carlisle, 3s.; Stalybridge, 3s.; Derby, 2s. 11d.; Warrington, 2s. 9d.; Plymouth, 2s. 9d.; Cardiff, 2s. 9d.; Birmingham and Staffordshire, 2s. 6d.; Newcastle-on-Tyne, 2s. 6d.; and Walsall, 2s. 4d.

Illuminating Power of Gas.

The amount of illuminating power of gas depends not only on the quality of coal used in its manufacture, but on the labour and care bestowed upon its cleansing and purification, for the purer the gas the more intense will be its light. By the Act of 1855 the maximum illuminating power was not to be less than 12 wax candles of six to the pound, burning 120 grains an hour. This miserable light continued till 1866, when threatened opposition by the Town Council to the gas company's bill then before Parliament raised the illuminating power to a maximum of 15 candles; which, however, is still very much below what the position of the town, in respect to its coal-fields and the advanced science of the day, ought to ensure the gas consumers. During the past six months the average of illumination has been reported to be 16 candles.

Comparison with other Towns of Price and Illuminating Power.

The following table exhibits the price of gas when compared with the illuminating power in various towns. Column 1 gives the towns; 2, the illuminating power; 3, the price per 1000 feet; 4, price of gas in each town when compared with the price and illuminating power in Sheffield; 5, price of gas in Sheffield when compared with the illuminating power and price in the other towns:—

1.	2.	3.	4.	5.
Sheffield	16	3s. 3d.	—	—
Glasgow	31	4 6	2s. 3½d.	6s. 3½d.
Manchester	22	3 2	2 2½	4 5½
Salford	20	3 4	2 8	4 1
Burnley	17	3 6	3 3½	3 5½
Port Glasgow	28	5 0	2 10¼	5 8½
Paisley	29	4 2	2 3½	5 10½
Rochdale	20	3 8	2 9½	4 0½
Greenock	29	3 9	2 0½	5 10½
Edinburgh	32	4 2	2 1	6 6
Bury	19	3 4	2 9½	3 10½

By the foregoing table it is readily seen that the price of gas in Sheffield is considerably higher than in many other towns, and especially higher than in those towns where the manufacture of gas is in the hands of corporations. Indeed it has been clearly proved, by the evidence taken before select committees of the House of Commons during the last three or four sessions, that the management of gas-works by public bodies secures an abundant supply of excellent gas at very low prices; that in several important towns in England, while a low price has been charged by the corporations for the gas supplied by them, large sums have been voted from the profits still remaining in reducing the public assessments, or in effecting important public improvements; and that while there is much evidence as to the satisfaction afforded by the supply of gas being in the hands of public boards, there is none of its having caused dissatisfaction in the case of any town where such a supply has been established. In proof of the above statements, your committee has had placed before it a number of letters, obtained in 1867 by the Dundee Corporation, containing answers to the following questions:—1st, Whether the quality of gas supplied has improved or deteriorated since transferred to the Town Council? 2nd, Whether the price has advanced or declined? 3rd, Whether the acquisition of the works has proved profitable to the community or otherwise? To these questions answers were returned, which are tabulated for the sake of brevity:—

Towns.	Question 1.	Question 2.	Question 3.
Burnley	The same.	Reduced.	Profitable.
Birkenhead	,,	,,	,,
Paisley	Improved.	,,	,,
Ripon	,,	,,	,,
Carlisle	,,	,,	,,
Oldham	,,	,,	,,
Sowerby Bridge	,,	Same price.	,,
Stockton	,,	Reduced.	,,
Bury	The same.	,,	,,
Port Glasgow	Improved.	,,	,,
Rochdale	,,	,,	,,
Halifax	The same.	,,	,,
Salford	Improved.	,,	,,
Manchester	,,	,,	,,

By its gas-works the Salford Town Council makes an average annual profit of £20,000; in Oldham, up to 1867, the profits amounted to £120,000; in Bury the profits annually amount to about £4000; in Paisley, up to 1867, the profits were £37,000; in Rochdale the profits amounted to £40,000; and in Carlisle to £21,000. In Bury the profits average £2000 per annum; in Newcastle-on-Tyne to about £19,000 per annum. In Manchester, up to 1865, the profits formed the large sum of one million of money—last year the profits being £49,485. Indeed, large profits are shown to be made in all cases where the gas-works are under the control of public bodies, thus placing in their hands the means of reducing the rates and advancing improvements. Your committee, feeling anxious to secure evidence of later date than 1867, and of further testing the success or otherwise of gas-works under the management of Town Councils, forwarded to various town-clerks a number of questions, the answers to which all evince general success, and great advantages for the gas consumers and ratepayers in general. The report here gives the results of several of these questions and answers, which we subjoin

in a condensed form. The profits made by the Sheffield Gas-Works, in 1868, amounted to £35,422; of that sum £31,671 went in payment of dividends, and £1689 in payment of mortgages and bankers for interest. The yearly salaries of the officials amounted to £2300. The profits made by the Burnley Gas-Works in the same year were £5465; the salaries of the officials were £283; and the town-clerk of that town says: "The purchase of the gas-works by the corporation has been undoubtedly of great advantage to the ratepayers, and the means of greatly reducing the rates." The profits made by the Oldham works were £21,115; the salaries amounted to £400. At Stockport the profits were £2602, and the salaries £300. At Salford the profits were £18,957, and the salaries £550. At Paisley the profits were £4901. At Port Glasgow the salaries amounted to £150. At Stockport the profits were £3597, and the town-clerk says: "The town, by having the gas-works, have been able to make many improvements from the profits, £40,000 of which has been appropriated for that purpose." At Walsall the profits were £2236, the salaries £249, and the town-clerk says: "Since the company was transferred we have paid off £28,000 of a debt amounting to £40,000, and this entirely out of profits." At Newcastle-on-Tyne the profits were £16,182, and the salaries £1050. At Bury the profits amounted to £3871, the salaries to £300. At Manchester there are two gas-works, and the profits made by both were £49,485; the total salaries amounted to £2000. The manager of the works says: "The advantages are that the corporation have, out of the gas profits, effected valuable improvements without the aid of an improvement-rate, and that for a limited period the water-rates were kept down in amount by the application of one moiety of the surplus gas profits for that purpose. At Carlisle the profits were £3061, and the salaries £370.

Past Management of the Company.

The history of the Sheffield United Gaslight Company, with the exception of the last three years, has been one of war and antagonism to the public interests and wishes. The opposition given to the gas-fitters, the bad quality and dearness of the gas, raised up in 1850 the Sheffield Consumers Company, which, after struggling for life during nearly five years, expired in 1855, and was absorbed by the present company, which sacrificed £60,000 to put down competition. The present called-up capital of £330,875 5s. is at least £100,000 beyond the requirements of the town, and is an amount upon which the gas consumers are paying 10 per cent., and the cause of the present price and small illuminating power. The great anxiety of the directors evidently is now to arrive at the period when the new shares, under the Act of 1866, may be issued—since such shares would at once bear *seven per cent.*, making each £100 worth at least £150, with an ultimate prospect of paying *ten per cent.*, and being worth £200. The issue of such additional capital is, however, entirely unnecessary, since at Neepsend there is working capacity for the manufacture of gas sufficient to supply Sheffield for a long series of years; whilst at Effingham Street works there is room for at least double the existing storeage. Up to the present time no effort has been made to economize or repress the expenses. Unnecessary mains have been laid down in districts that can never pay 2 per cent., and of such a size as to be quite beyond the requirements of the supply demanded. Land has been purchased and works commenced which need not be brought into use for many years, if at all; salaries given ridiculously out of character with the work to be performed, and shares called up to pay 10 per cent., in lieu of borrowing at 4 or 4½, and this with a large and increasing reserve-fund. That the Sheffield Gas Company is managed with an extravagance beyond that of any other gas company is readily seen by the amount of salaries paid to the manager, engineer, chief accountant, &c., as compared with the salaries paid to similar officers in other gas-works—the salaries of manager, engineer, accountant, and cashier amounting, in Sheffield, to a grand total of £2300 per annum, an annual wasteful expenditure of at least £1000. It may be thought the gas consumers have a security against undue extravagance and bad management, under clause 61 of the Sheffield Gas Act, 1855. By this clause the Town Council have the power of nominating three directors, who shall not be shareholders in the company, to act on behalf of the town; the actual influence of the nominee directors at the board is, however, very fallacious, since they are only *three* to *nine share* directors, and are readily outvoted.

Proposal to Purchase.

From the foregoing facts, and other evidence it is not necessary to place in this report, your committee are unanimously of opinion that it will be for the public good that the manufacture of gas in Sheffield should be in the hands and under the control of the Town Council, in order to secure the highest illuminating power, gas of pure and uninjurious quality, lowness of price, and the annually increasing profits, which could be applied either in reduction of the rates or as a means of improving the town. At present the company have every inducement to spend money, to force on the time for the issue of the new shares, thus preventing the rapid and proper reduction in price and improvement in quality. It is almost an admitted principle that works such as are required for gas and water should be managed for the good and in the interest of the general public, and not solely for the advantage of individuals or companies. This principle is largely carried out by Government in its undertaking the control of the Post-Office, savings banks, telegraphs, &c. Indeed, there can be no doubt as to the advantages to be gained by public over private management. Should the Town Council determine upon the purchase of the works and interest of the Sheffield United Gaslight Company, the shareholders, the gas consumers, and the general public might, by a fair and honourable arrangement, be all equally advantaged. It is just to suppose, and indeed there can be little doubt but that the shareholders would freely transfer their property to the Town Council upon equitable and secure terms, for it cannot be forgotten that it is only 59 years since the first public gas company obtained an Act of Parliament—a very short period in the annals of science—or that gas-works are a class of property which cannot be considered as permanent or free from injury through scientific discoveries, as are many other forms of investment. For the purchase of the works money might be borrowed at 4 or 4½ per cent., repayable in 30 years, nearly the whole of which, principal and interest, could be secured out of the profits, which, with increased economical and careful management, could not be less in a few years than £50,000 per annum. Such a mode of purchase your committee, however, do not recommend, since it would, to a large extent, be taxing the present generation of ratepayers for the advantage of a future, and would also prevent for a long period any improvement of the town out of the profits. The plan pursued at Paisley, Oldham, Bury, Dundee, Glasgow, &c., might be followed with advantage at Sheffield—that of purchasing by *granting annuities* secured on the rates and the gas-works. These annuities might either be in perpetuity or redeemable. Some such plan would be fair and desirable for the shareholders, and would cast no weight upon the shoulders of the ratepayers. The consideration of the amount of such annuity is not in the province of your committee to enter upon, it is sufficient to state that at Oldham *ten per cent.* was given, the company paying 10 per cent.; at Glasgow *nine per cent.*, the old company paying *ten per cent.;* at Paisley, 6⅝ per cent., the company paying 8 per cent. As these annuities, even in perpetuity, would constantly be in the market, power might be taken by the corporation to purchase them, and so gradually reduce the amount of the annuities, and increase the yearly profits for the benefit of the town. Should this plan be adopted it will be necessary in case at any time, owing to bad trade or other causes, a loss should arise upon the supply of gas, that a reserved fund should be established to meet such loss and to protect the annuitants. In conclusion, your committee earnestly recommend the council to take the necessary steps for securing (by mutual arrangement if possible) the transfer of the works of the Sheffield United Gaslight Company to the corporation, and, for the carrying out of such object, prepare a bill for the ensuing session of Parliament.

TOWN COUNCIL, WEDNESDAY, SEPT. 8.

Alderman SAUNDERS requested that the consideration of the report might be adjourned, as scarcely sufficient time had elapsed to enable it to be carefully perused. It was only published last evening, the nominee directors not having been able to complete it till very recently. He would move that the council be adjourned till Monday next, for the purpose of receiving and adopting or otherwise the gas report, and passing any resolution or resolutions thereon. It was only fair to all parties that time should be given to allow the report to be carefully read; and it could not now be discussed without occupying more time than perhaps the council could spare.

Alderman CROWTHER: You had better adjourn the matter till the next council meeting.

Alderman UNWIN (managing director of the gas company): Allow me to say one word about the adjournment.

Alderman SAUNDERS (who had not resumed his seat) objected to Alderman Unwin saying anything till he had finished. The reason he proposed the adjournment to an early day was, that if the council decided upon taking any steps this year with regard to the purchase of the gas-works, those steps must be taken soon, for their bill must be sent to the parliamentary office by the 30th of November. If the matter were adjourned to the next meeting of the council, which would be on the second Wednesday in October, it would have to stand over for twelve months. He was not afraid of the report being scrutinized, and he hoped gentlemen opposite to him were not afraid of going into it.

The EX-MAYOR seconded the motion.

Alderman UNWIN said it was impossible for him to be in town on Monday, as he was going away that afternoon, and should not return for three weeks.

Alderman SAUNDERS: But the town cannot wait for Mr. Unwin.

Alderman UNWIN: If it is adjourned to next Monday, or the Monday following, I cannot be here, or devote any time to it.

A COUNCILLOR: Then, if you please, go into it now.

Alderman UNWIN: I am bound to say that the report is full of inaccuracies.

Alderman CROWTHER: Yes, there is one of £11,000—a little item of that sort.

Alderman SAUNDERS: Will this day fortnight suit Mr. Unwin? I do not want to hurry him in his calculations. Will this day fortnight do?

Alderman UNWIN: I do not know.

Mr. HARVEY: Let him come home for an important question like this.

Mr. HUTCHINSON: Will you appoint a day, Mr. Unwin?

Mr. HARVEY: Whatever day you appoint Mr. Unwin will be here, you may depend your life upon that.

It was then decided that the meeting should be adjourned for a fortnight, and the council separated.

SUPPLY OF GAS TO WREXHAM.

At the Monthly Meeting of the Wrexham Local Board, on Thursday, the 31st ult.—the MAYOR (Thos. Rowlands, Esq.) in the chair—

Alderman ROWLAND moved—"That a portion of the present land and buildings forming the slaughter-house property be made use of for the erection of gas-works by the local board; and that a committee of the whole board be formed for the purpose of forthwith carrying out the works necessary for such purpose." He had been informed that the existing gas company were going to apply for an Act of Parliament granting them an extension of powers. After the powers they enjoyed at present, what, he asked, could they want with a fresh Act of Parliament? He had reluctantly come to the conclusion that they would be seeking for powers which would place the town entirely at their mercy, and enable them to charge what they chose for their gas, and prevent the possibility of competition. It behoved the town to strive to prevent such an act as that, which would be no less than a public calamity. Even now the charge for gas was higher in Wrexham than in other places, although the town was in the very centre of a district where the material abounded from which gas was produced. It had been said of gas-works and water-works, that when they were placed under the control of the local authority they did not pay. But such was not the case. At Manchester the gas-works were under the immediate control of the mayor and corporation, and Manchester was one of the best-lighted towns in the kingdom. The illuminating power was very high, being, as he was informed, equal to 20·87 candles. The price of gas at Manchester was 3s. 2d.; at Wrexham it was 4s. But that was not the only advantage. The 3s. 2d. realized last year a profit of £49,500, and that gas was produced from Welsh coal carried from a great distance. If this advantage could be gained in Manchester, which is so far from the coal country, why should it not be gained in the very midst of the coal district? Why should Wrexham not have gas of its own as well as Manchester? As to the cost of erecting works, it would not be anything like what it appeared at first sight. The local board had land of their own, which they did not know what to do with, and which would form a most eligible site for the erection of such works.

Mr. THOMAS JONES seconded the motion for three reasons. He was firmly impressed, in the first place, with the idea that the gas-works ought to be under the control of the town; secondly, that gas could be supplied at a less cost than it is at present; and, thirdly, that they had an excellent place for the erection of works. At present they were obliged to go to the existing company and give their terms whatever they chose to ask. He appealed to the members of the meeting as men of sense, and asked them was this a proper position in which to be placed? As guardians of the borough's interests, were they now to sit quietly by and see the gas company obtain an Act of Parliament which would place the ratepayers more completely at their mercy than ever? What did the intended application for an Act of Parliament mean, if not to place the company in a position to defy the town? He hoped the good sense of the council would not allow that to be the case. According to the last report there were 2400 shares in the company, of which 1120 were held by foreigners—people living in London and elsewhere—who did not care a farthing about the interests of the town, but only looked for a large dividend on their investment. If there was profit to be derived by the making and selling of gas, let those who lived in the town be the persons to derive that profit. The salaries of the officials of the company amounted to £319 4s. The corporation had a staff of servants already, and very little more expense—say, at the outside, £150—would be sufficient to increase that staff to a number fully equal to the working of the gas-works. He was told

that the company had been to very great expense; but he knew that entirely new works could be built for a third less than the present works had cost. The capital of the company was £12,150. If the local board could construct better works for £8000, the interest on which would be £400 a year, the saving on the public lamps, for which they were now paying £420 a year, would more than meet the interest on the capital. If these were facts, he asked those present to remember that they represented the people of that borough, and that it was their duty to protect the borough's interests. If they erected works of their own they would be well repaid the outlay of their money, and the town would thank them.

Mr. SNAPE opposed the motion. He was one of the largest consumers of gas in the town, and he should like to have it at a lower rate than at present, but he believed that for the town to construct gas-works of its own would be simply a waste of money. They had surely had experience enough, and they had brought censure upon themselves by the expenditure of money on the slaughter-house and other works, but the gas-works would be the worst of the three. The gas company had their own interest in the works. They could draw on their capital, and, being in possession of the field, was it likely they were going to allow a new company to dislodge them? In case of a new company being formed to sell gas at a lesser rate than at present, the old company would undersell the new company at once. If that were the case the new company could not pay. The present company ought to reduce their price, but to talk of reducing it to 2s. 6d. would be wrong. Besides, what benefit would it be to the consumers to be connected with the new company unless they had money in it, and no new company could compete with the old. If the local board liked to buy the present gas-works he would agree with them, provided they were purchaseable at a reasonable price.

Mr. SYMAN did not believe that the gas company would sell their works at such a price as the council could give.

Alderman BURY said that the gas company had recently reduced their price, and they would do so again. He had been connected with the company from the first. It was true that many of the original shareholders had left the town, and were residing elsewhere; but it would be scarcely gracious, on that account, for the present generation to oppose the old company, which had provided gas-works for them in the first instance. As to Alderman Jones's remarks about Manchester, and how cheap gas was there, he must take into consideration the amount of consumption. One street in Manchester would consume more gas than the whole of this town.

The MAYOR: What powers do they ask in this Act for which they intend applying?

Mr. BURY: I do not know. I was in South Wales when all this was going on.

The MAYOR: If they seek to put us under their feet, I should certainly go in for Alderman Rowland's motion.

Alderman BURY: It may be they seek the right which they do not now possess, to open the streets for the laying of pipes.

The MAYOR said he should go with Mr. Bury if he knew that the gas company did not mean to coerce the town; but if they were seeking to put the town under their feet he should most strenuously oppose them.

Mr. DAVIES thought they could not trust the present company. At the last board a resolution was passed, in accordance with which a deputation waited on the company asking them to reduce their price. They did not do so, and the reason they gave was not because it would not pay to do so, but because they were supplying gas as low as was done in other towns. He should certainly vote for this motion, for even assuming that the old company lowered their charge in order to undersell the new company, the ratepayers would rather pay 6d. more and stick to their own company.

Mr. MURLEES: If Mr. Rowland would alter his motion, and ask the gas company to sell, he thought there could be no opposition to it; but he did not think they ought to turn now and fly in the face of the present company. To say the least of it, it would be a piece of ingratitude.

A MEMBER thought there was evidently something suspicious in this application by the gas company for a new Act. If the town was paying as much for their public lamps now as would defray the interest on an outlay sufficient to construct new works, then he considered that the adoption of Alderman Rowland's motion would be a great public benefit. In the first place, they saved money in the purchase of land. He wished to know whether there was any difference in the price of gas to the public lamps since it was reduced to private consumers.

The CLERK: It has not been reduced to us for the last three years. The reduction to private parties took place last year.

The EX-MAYOR: Whilst I admit that the town is too small to allow of two sets of gas-works, still I must say I think the present gas-works are not in a state to produce cheap gas. Their gasometer, for instance, is far from the other portions of the works; and there could not be a better position for gas-works than the site of the slaughter-house, and, with properly constructed works, gas could be produced at a rate very much cheaper than the present.

After a reply from Alderman ROWLAND, the motion was put from the chair, and carried by a majority of six.

DISCOVERY OF COAL IN NOTTS.—It does not seem long since some of our geologists predicted that no coal was to be found alongside the Trent in the neighbourhood of Nottingham; and, still more recently, many in the town have entertained an opinion that, after all, the Clifton Collieries would be unsuccessful. The borings certainly proved everything that was desirable; yet still there was a doubt, and even some of those who were most anxious for the success of the undertaking felt occasionally a misgiving upon the matter. Ever since the commencement of the sinking operations, with the exception of an interval on the occasion of Sir Robert's death, the work has been going on with all possible rapidity, under the able direction of Mr. Samuel Marsh, who apparently manifests as much interest in the undertaking as if it were his own concern. Various strata were penetrated, until, at about four o'clock on the morning of Wednesday, the 1st inst., coal measures were at length reached. The shaft was sunk 9 yards into them, and they were found to be exceedingly perfect and regular. The rock that has been pierced contains also in the veins a considerable quantity of lead. After this had been gone through, a carboniferous rock thickly stratified was found. This rock was 3 feet 9 inches in thickness, and it was much marked with coal. The next discovery, and one of the most important that had been made, was that of pure "bind," the appearance of which proved beyond a doubt the correctness of the borings. The depth of the bind sunk through was about 6 feet, and on Monday the first really good coal was brought to the surface. The exact thickness of the seam is not known, but the coal which it has yielded is of the finest quality—in fact, as good as it could possibly be wished to be. It is now being brought up in good quantities; but the seam, we understand, will not be worked until the shaft has been sunk considerably lower. In sinking, in the part of the field where the shaft is, much of the middle red sandstone formation which was met with in boring has been missed; but the "bunter," or lower new red, as it is called, has been met with, and it is of a similar kind, we understand, to that which overlies the coal measures in the greater part of Europe. The shaft will be a dry one, and, under the excellent arrangements which are adopted at the collieries, the sinking will doubtless continue to proceed most successfully.—*Nottingham Guardian.*

A CITY IN WANT OF WATER.—Water in our reservoirs continues to "grow small and beautifully less." Every factory, refinery, and other establishment making large use of water, has been notified by the authorities to desist, and numbers of them have either entirely ceased operations, or else make only half or quarter time. The pecuniary loss by this suspension, both to employers and employed, is enormous. It reaches many thousands of dollars each day. Many of the factories in the city, and other establishments that use large quantities of water daily, have already commenced the excavation of wells to furnish them in case of necessity, and most of the old wells covered up for years have had pumps reinserted into them for the emergency. The necessity for a sparing use of the water on the part of each and every one is manifest.—*Philadelphia Telegraph*, Aug. 19.

DR. FRANKLAND'S ANALYSIS OF THE METROPOLITAN WATERS IN AUGUST, 1869.—"Royal College of Chemistry, Aug. 28, 1869.—Sir,—I have the honour to submit to you in the following table the results of the chemical examination of the waters supplied to the metropolis during the month of August. For the purpose of comparison I append also the results yielded by the waters supplied to the towns of Edinburgh, Newcastle, Glasgow, Manchester, Bristol, Dublin, and Norwich, and by samples of Thames water taken at London Bridge at low and high water; also by the well waters from the artesian well in Trafalgar Square, from the Royal Mint, and from Barclay's Brewery. The samples from the mains of the Southwark, Lambeth, and East London Companies were slightly turbid, the waters supplied by the other companies were clear and transparent. The Southwark and Lambeth Companies waters contained living organisms.

Companies.	Date and Place of Collection.	Temperature in Centigrade Degrees.	Total Solid Impurity.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen, as Nitrates and Nitrites.	Total combined Nitrogen.	Previous Sewage Contamination (Estimated).	Chlorine.	Total Hardness.
Thames.											
Chelsea.....	Aug. 2 — Cab Rank, Horse Guards.....	18·9	25·16	·125	·021	·000	·157	·178	1250	1·52	20·63
West Middlesex	Aug. 2 — Cab Rank, Portland Road..	19·7	23·90	·088	·017	·001	·121	·139	900	1·50	20·34
Southwark & Vauxhall..	Aug. 2 — Cab Rank, Saint George's Ch.	19·7	23·86	·111	·017	·001	·121	·139	900	1·50	20·34
Grand Junction.....	Aug. 2 — Cab Rank, Woodstock Street.	18·9	24·96	·098	·021	·000	·129	·150	970	1·57	20·34
Lambeth....	Aug. 2 — Cab Rank, Lambeth Road..	19·2	25·24	·126	·018	·000	·160	·178	1280	1·53	20·34
Other Sources.											
New River...	Aug. 2 — Cab Rk., Tottenham Ct. Rd.	19·4	24·04	·070	·018	·000	·169	·187	1370	1·43	20·34
East London.	Aug. 2— Slater's, Old Ford Road .	17·8	22·50	·068	·016	·000	·085	·101	530	1·72	20·22
Kent.....	Aug.2—Deptford Bridge Police Statn.	15·0	40·96	·018	·008	·000	·421	·429	3890	2·30	29·93
Edinburgh Waters.											
Crawley Burn	Sept., 1868.		11·28	·187	·031	·001	·000	·032	0	1·042	6·1
Comiston Wr.			22·58	·085	·017	·001	·744	·762	7124	1·886	10·4
Swanston Wr.			12·70	·378	·059	·001	·000	·060	0	1·390	6·2
Colinton Wr.			14·10	·203	·042	·000	·000	·042	0	0·894	9·2
Newcastle...	September ..		23·40	·237	·062	·000	·000	·062	0	1·558	13·9
Loch Katrine	July, Glasgow		3·00	·161	·011	·001	·000	·012	0	·905	0·3
Manchester..	June.....		6·20	·183	·009	·006	·025	·039	0	1·117	3·7
Bristol.....	Feb., 1869 — Water-Works		28·66	·160	·017	·001	·203	·221	1720	1·3	24·46
Dublin	April, 1869 — Water supply		6·34	·238	·024	·001	·000	·025	0	1·24	2·97
Norwich.....	Sept., 1868— Norwich w. s.		28·18	·227	·055	·000	·000	·055	0	2·631	23·68
Thames water filtered....	April 27, 1869, Lond. Bridge, mid-stream at low water		30·35	·455	·075	·032	·181	·282	1750	1·95	22·7
	at high watr		92·85	·540	·122	·025	·394	·537	3830	31·5	23·9
Artesian well water	May 6, 1869— Trafalgar Sq.		83·4	·150	·012	·070	·000	·070	260	16·55	5·92
Deep Chalk well water.	June, 1869— Royal Mint.		83·96	·195	·025	·060	·000	·074	170	13·92	17·48
Deep well wr.	July, 1869— Barclay's B.	12·1	73·3	·085	·008	·060	·000	·057	170	14·08	7·33
Column 1	2	3	4	5	6	7	8	9	10	11	12

The numbers in columns 4, 5, 6, 7, 8, 9, 10, 11, and 12 all relate to 100,000 parts of the waters. The table is to be read thus: The Chelsea Company's water collected on the 2nd of August, at the Horse Guards cab rank, had a temperature of 18·9° Cent.; 100,000 lbs. of it contained 25·16 lbs. of solid impurity; the organic matter, constituting a portion of this impurity, con-

tained ·125 lb. of carbon and ·021 lb. of nitrogen. This solid impurity also contained ·157 lb. of nitrogen in the form of nitrates and nitrites, and the total amount of *combined* nitrogen in every form was ·178 lb. The above quantity of water supplied by the Chelsea Company had been, after its descent to the earth as rain, contaminated with sewage or manure matter equivalent to 1250 lbs. of average filtered London sewage. By gradual oxidation, partly in the pores of the soil, partly in the Thames and its tributaries, and partly in the reservoirs, filters, and conduits of the company, this sewage contamination had been converted into innocuous inorganic compounds before its delivery to consumers. The above quantity of water also contained 1·52 lb. of chlorine. Finally, 100,000 lbs. of the Chelsea Company's water contained 20·63 lbs. of carbonate of lime, or an equivalent quantity of other soap-destroying ingredients.—I have, &c., E. FRANKLAND.—The Registrar-General, &c."

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, IN JULY, 1869:—

JULY.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
Distilled Water . . .	July, 1868. 0°	July, 1869. 0°	July, 1868. 0°	July, 1869. 0°	0°
West Middlesex water	16·16	16·28	0·52	0·64	—
Grand Junction water	16·04	16·44	0·56	0·56	—

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, IN JULY, 1869:—

JULY.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quantity of Sulphur in 100 Cub. Ft.	Mean Quantity of Ammonia in 100 Cub. Ft.	Sulphuretted Hydrogen.
	* Mean of 27 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas . .	15·91	16·96	14·92	26·05	9·96	32·30	3·53	None.
Chartered Company's common gas	15·22	16·47	14·15	34·45	14·96	29·83	9·23	None.
Chartered Company's cannel gas	21·45	22·67	20·48	26·38	14·10	20·78	8·31	None.

Mean of daily readings of Barometer, 29·85
" " " Thermometer, 72·77

* Each observation consists of 10 readings of the photometer, at intervals of one minute.

The Imperial Company's gas showed a range in its illuminating power during the month of about 2 candles, its highest being 16·96 candles, and its lowest 14·92 candles; the mean was very nearly 16 candles. It was found to contain, on every testing, a large excess of sulphur, the mean being rather more than 32 grains in 100 cubic feet. The ammonia, on the contrary, was considerably less in quantity than what is usually found, amounting to only 3½ grains in 100 cubic feet, or 1½ grain less than what is permitted by the Act. The range in the illuminating power of the common gas of the Chartered Company was 2·32 candles, the highest being 16·47 candles, the lowest 14·51 candles, and the mean 15·22 candles. In this gas, not only the sulphur, but the ammonia also, were both largely in excess. The illuminating power of the cannel gas ranged from 22·67 to 20·48 candles, the mean being 21·45 candles In this gas the sulphur was not largely excessive, but the ammonia exceeded the legal quantity by upwards of 3 grains. On no occasion was sulphuretted hydrogen detected in either of the gases.

SUBWAYS IN THE CITY OF LONDON.—An Act of Parliament was passed in the last session to make provision respecting the use of subways, under the management of the Commissioners of Sewers of the City of London. It recites that subways are in the course of construction under the viaduct or raised way, and parts of the new streets in the City of London; and the same, when completed, will be under the management of the Commissioners of Sewers; and, in order to prevent inconvenience to the public, and the frequent breaking up of the surface of the viaduct and new streets, the commissioners should be enabled to require companies, bodies, and persons intending or required to place water, gas, or other pipes, to lay them in the subway on proper terms and conditions. The Act invests the commissioners with power to carry out the provisions, and provides remedies against parties violating the terms and conditions annexed to the undertakings. The commissioners, as far as space will permit, are to allow pipes to be laid in any subway under their management, and are to exercise a general supervision as to ventilation, and in case of difference the matter is to be referred to the Board of Trade. Penalties to £20 may be recovered for an infringement, and pipes removed, and costs recovered. At the present time pipes are being laid down under the Holborn Viaduct.

GAS FROM SEWAGE.—The *Pall Mall Gazette* of Saturday last contained the following extraordinary information and characteristic commentary:—"A discovery has been made in India which renders it not impossible that not only may Sir John Thwaites and his boon companions be able to resume those banquets which poverty has for a time so ruthlessly cut short, but that the Metropolitan Board of Works may actually succeed in setting the Thames on fire at last. It seems that sewage may be utilized by being converted into gas. Experiments have been successfully tried at Darjeeling and Calcutta, and it is now proposed to apply the process to some of the larger cities. The gas must be much better than that supplied by our gas companies at home, for it is said 'to burn brightly'—a compliment which cannot be paid to the expensive commodity which helps only to make darkness visible with us. Instead, therefore, of gazing through tears on a polluted river and a bankrupt Board of Works, we may look forward to a pellucid stream, a wealthy corporation, and a brilliantly lighted city, with a diminished gas-rate. There will also be one inestimable advantage to be derived from the adoption of the scheme. By blending our gas-pipes with our drains it will only be necessary to dig up our thoroughfares once, instead of twice, a month." The *Pall Mall* is seldom successful when it deals with scientific subjects, but does not often display so much ignorance as is shown in the above "Occasional Note." The foundation for the remarks is probably the not original discovery that sewage, on standing, gives off marsh gas, which everybody but the smart writers on the *Pall Mall Gazette* knows to burn with but a faintly luminous flame. With the additional information that 24 gallons of sewage, after standing a week under the most favourable conditions, give off about a cubic foot of gas per day, we may leave the writer of the above paragraph to imagine the nature and extent of the works necessary to furnish from sewage the millions of cubic feet of gas required for the daily illumination of London by a gas which, on burning, gives very little light.

Register of New Patents.

2959.—PETER SPENCE, of Newton Heath, Manchester, in the co. of Lancaster, manufacturing chemist, for "*Improvements in the manufacture of copperas, applicable to the purification of illuminating gas, and to other purposes.*" Patent dated Sept. 26, 1868.

In carrying out this invention for improvements in the manufacture of copperas applicable to the purification of gas and other purposes, iron ores are employed that contain a large amount of protoxide of iron, and it is preferred that they should contain not less than 25 to 30 per cent. of iron in the state of protoxide. The iron ores suitable for the purpose include the clay ironstones, the Cleveland volitic iron ores, the Lincolnshire ores, and others, provided they have not been weathered and so converted into peroxides of iron, and any other ores in which the iron is chiefly in the condition of protoxide, protosilicate, or protocarbonate. Slags from the ore-furnace of the copper smelter are also used, which contain a large quantity of protosilicate of iron, and other slags of similar composition. These ores and slags are ground to powder, and it is found that the powder is fine enough when passed through a sieve of 20 meshes to the lineal inch. Of this powder 200 lbs. is taken, and having ascertained its proportion of iron in the state of protoxide, the quantity of acid required to combine with all the iron contained as named is calculated. The powder is put into a shallow basin in the floor of the house, and when the acid to be used is sulphuric acid of the ordinary chamber strength of 120° of Twaddle's hydrometer, or 1·6 specific gravity, then before adding the acid an ordinary bucketful of water is mixed with the powder in the basin, if the ore contains from 50 to 55 per cent. of iron in the state of protoxide. To this is added an equal weight, or 200 lbs., of the acid of 1·6 specific gravity, and more or less according to the proportion of protoxide of iron in the powder. The workman now stirs the mixture with an iron rake or shovel, bringing up the powder from the bottom of the basin into the liquid; in a few minutes it heats and becomes semi-liquid, then boils, and almost instantly becomes a pasty mass; it is then thrown out, and when cool becomes perfectly dry. Instead of mixing water with the powder before adding the acid, it is found profitable to use from four to six bucketfuls, or, say, 8 to 12 gallons of the mother liquor of the alum manufacture, which contains sulphate of iron, alum, and free sulphuric acid, and it is found that when the alum mother liquor so used is of the specific gravity of 1·3, then, whatever weight of it is so used, half of such weight can be deducted from the acid to be subsequently added; or there can be used, instead of water or alum mother liquor, the liquor produced in ordinary copperas, making as it runs from the copperas bed where iron pyrites is allowed to decompose by atmospheric action, and when using this liquor one-third of its weight can be deducted from the quantity of acid to be subsequently added to the powder operated upon, and in each of these cases the required action takes place, and the product is equally dry and fit for the purposes to which it is applied. The substance produced, as described, and which is named dry copperas, may be used for nearly all the purposes for which crystallized green copperas or protosulphate of iron is now used, the solution obtained from the dried powder by hot water being nearly identical with a solution of green copperas, and fitted for similar uses.

The special purpose for which the dry copperas is found extremely suitable is the purification of illuminating gas from compounds of ammonia, and subsequently from sulphuretted hydrogen, and for both these purposes it can be used in the ordinary dry-lime purifiers.

Crystallized copperas, mixed with sawdust and otherwise, has long been used for separating ammonia compounds from illuminating gas, but great complaints have arisen of its allowing ammonia to pass, the crystallized form not being mechanically well adapted for the retention of these compounds. The dry copperas, as made by this invention, is found from its granular form not to allow any of the ammonia to pass until all the sulphate of iron in the dry copperas is decomposed; its open-grained condition and comparative freedom from water of crystallization also prevent its becoming clammy, and so causing obstruction to the passing of the gas.

After passing illuminating gas through the dry copperas till all the acid is combined with ammonia and the iron is precipitated, it is found that, though no longer capable of abstracting ammonia, it is now specially adapted for the decomposition and separation of sulphuretted hydrogen, all that is required being that the material have air passed through it alternately with the gas, as is well known, or that it be thrown out of the purifiers and be allowed to lie for a few hours to oxidize the iron, when it is again fitted for use, and it is found that it is more easily oxidized than the greater portion of the natural oxides of iron now used for purifying illuminating gas from sulphuretted hydrogen.

A similar compound, which is also named dry copperas, but restricted in its use to the purification of illuminating gas from ammonia and sulphuretted hydrogen as described, is made by substituting the muriatic acid of commerce for sulphuric acid, and in making this article no water or liquor is used. To 200 lbs. of the powder, containing 50 to 55 per cent. of protoxide of iron, 400 lbs. of the muriatic or hydrochloric acid of commerce is added, and mixed in a similar manner. The action is the same, and when the pasty substance obtained is mixed with sawdust or other drying body it is thereby converted into a dry granular mass fitted for the purification of gas, as described, and it is so used when preferred.

2987.—EDWARD HORTON, of Birmingham, in the co. of Warwick, gas chandelier maker, for "*Certain improvements in the manufacture of chandeliers and other gas-fittings, having especial reference to the pulley-wheels, rosettes, and balance-weights, smoke-shades, Argand burners, and other similar parts used therein.*" Patent dated Sept. 30, 1868.

This invention consists substantially in making the pulley-wheels, rosettes, and balance-weights, and the other parts used in the construction of chandeliers and gas-fittings of glazed vitreous earthenware instead of making the same parts of metal as is now customary. In this manner the gas-fitting is rendered more ornamental, and can be produced at the same or even at a less cost than at present. Besides the articles above-mentioned, the same material is applied for the centres of bodies for chandeliers and other gas-fittings and

for water-cups; but the use of the said material is disclaimed both for coronas or smoke-shades for globes and for Argand burners, the patentee being advised that the use of the said material for these articles may not be entirely new.

2993.—JOHN LAMBERT, foreman to the Rose Lane Iron-Works, Norwich, in the co. of Norfolk, for "*Improvements in apparatus for raising water.*" Patent dated Sept. 30, 1868.

According to this invention, as the top of the suction-pipe is fixed, there is a valve opening into a space or chamber between this valve and another above it, fixed in the top of a hollow air-tight plunger, forming a cylindrical air-tight chamber, closed at top and bottom, and encircling the suction-pipe, but of such diameter as to leave a space for water between the outer surface of the said chamber and the interior of the outer cylinder or pump-barrel.

3009.—JOHN FREDERICK GUSTAVE KROMSCHRŒDER, of Gloucester Street, Camden Town, in the co. of Middlesex, gas engineer, for "*Improvements in apparatus for generating an inflammable gas or vapour suitable to be burnt at gas-burners to yield light and heat.*" Patent dated Oct. 1, 1868.

In carrying out these improvements, clockwork is employed to give motion to an air-forcing apparatus, which forces atmospheric air into a chamber forming part of the same apparatus containing a volatile hydrocarbon oil. The apparatus is so arranged that an extensive surface of the volatile oil is exposed to the air. The air is led from the chamber by a flexible pipe or otherwise to the burner or burners at which it is to be burnt, and by a stop-cock the size of the flame is actuated. The clockwork is actuated by means of a spring, which operates through a fusee, so as to maintain a uniform action as the tenison of the spring varies.

3038.—WILLIAM ROBERT LAKE, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*An improved extension chandelier.*" A communication. Provisional protection only obtained. Dated Oct. 5, 1868.

These improvements consist in attaching to the top piece, in which is fixed the ring or hook for suspending the chandelier, a central rod, and closely coiled helical springs, three or more in number, are also attached at suitable points beyond the said rod, and at equal distances therefrom. The bottom part of the chandelier, to which the lamps, candles, holders, or burners are attached, is provided with a vertical tubular stem, which surrounds the rod, and which depends from the top part. The long helical springs before named are attached to the bottom part of the chandelier, and are so proportioned to the weight of the bottom or moveable part of the chandelier, that when such part is located about half way between its extreme points of movement, there is equilibrium. On the top of the chandelier-tube a piece, serving for the fulcrum of a lever, is secured, one arm being perforated with a hole a little larger than the diameter of the rod before mentioned, while the other arm receives at its end a string, chain, or other means by which the position of the lever may be changed.

3043.—JOHN RICHARDSON WIGHAM, of Albany House, Monkstown, in the co. of Dublin, Ireland, for "*Improvements in illuminating lighthouses and in apparatus employed for that purpose, which apparatus is also applicable to the manufacture of illuminating gas generally.*" Patent dated Oct. 6, 1868.

This invention relates to patents dated respectively April 4, 1865 (No. 945), and November 6, 1866 (No. 2871). It consists in illuminating lighthouses by means of combustible gases, prepared from coal, coke, or other similar carbonaceous substances, in a more or less pulverized state, and mixed with paraffin, petroleum, or shale oil, or other liquid or semi-liquid hydrocarbons, and also from peat, sawdust, and other similar vegetable matters, either alone or mixed with oil, paraffin, shale oil, petroleum, or other liquid or semi-liquid hydrocarbons. It also consists in an improved apparatus for the manufacture of illuminating gas, for the use of lighthouses, or for other purposes. The retorts, for the destructive distillation of the coal or other gas-making material, are arranged in a horizontal position, each retort being somewhat arch-shaped, having in its interior surface near the spring of the arch a projecting fillet, in order to support a moveable arched cast or wrought iron lining or partition, so constructed in one, two, or more pieces, that when placed in their proper positions they will have the effect of causing the greater part, if not all, of the gas distilled from the coal or other gas-making material to pass under and over them.

3094.—HENRI ADRIEN BONNEVILLE, of 18, Chaussée d'Antin, Paris, in the empire of France, and 10, Sackville Street, Piccadilly, in the co. of Middlesex, patent agent, for "*Improvements in pumps.*" A communication. Patent dated Oct. 9, 1868.

This invention consists, first, in a pump called orthodynamical, constructed in accordance with the principles of suction in the lifting-pumps usually known as chain-pumps. Second, in the transformation of the chain-pumps into portable exhausting-pumps, by adapting them to a frame which may be readily carried, and working them either in a vertical or an inclined position. Third, the disposition of the pump, so that it may be able to lift water to any height which a pump-barrel of a limited length should. Fourth, the construction of a chain which has the wedge gearing into the V-shaped throttle of a pulley or wheel. Fifth, the construction with any sort of chain, strap, rope, or cable, of chains, straps, cables, or ropes which permit the actuating of pulleys or wheels without sliding.

3101.—HENRI ADOLPHE ARCHEREAU, of 13, Boulevart St. Martin, Paris, France, chemist, for "*A new method of obtaining heat and light, and its various applications.*" Patent dated Oct. 9, 1868.

The invention consists in the application of flames produced by the combustion, at or near the point required, of solid, liquid, or gaseous inflammable matters in combination with suitable aids to combustion, by injecting the combustible matters under pressure, previously heated, into the various liquid, liquefiable, pulverulent, or viscous matters contained in suitable receivers, in order to heat or act chemically or mechanically on the said matters. The invention further consists in the application of the above-mentioned flames for the manufacture of iron and steel, and to chemical operations for the production of light and vapours, and for treating gases and vapours.

3109.—DAVID HALLAS, GEORGE HALLAS, and SAMUEL JOSEPH WOODHOUSE, all of Leeds, in the co. of York, for "*Improved apparatus for regulating the supply of gas to burners.*" Provisional protection only obtained. Dated Oct. 9, 1868.

According to this invention a tap or cock of peculiar construction is used. On the face of the centre part, within which the cock turns, an index marked at given intervals is placed, in order to denote that when the handle of the cock is severally opposite to them, gas for the various numbers of lights which they denote is being passed through. The rotating part of the cock itself is made hollow, and pierced in its circumference with holes of varying size, so regulated that each is capable of supplying a given number of lights, and no more, and the gas is emitted into the supply-pipe through an oblong port or slot in the cock which is opposite the holes.

3116.—WILLIAM HENRY SAINT AUBIN and BENJAMIN BENTON, of Wolverhampton, in the co. of Stafford, machinist, for "*Improvements in cocks, taps, and apparatus for drawing off liquids or gases from pipes, casks, or other vessels, and for filling casks and other vessels with liquids or gases.*" Provisional protection only obtained. Dated Oct. 10, 1868.

This invention consists chiefly in the construction of a socket, made of brass or other metal, having a flange at its front or outer extremity, and also perforations through the convex sides of the socket (which is intended to be fixed into the tap-hole of the cask). Into the socket a hollow conical plug is fitted, which also has perforations. Upon the solid end of the plug there is a screw, having a square shoulder passing through a washer, fitting tightly against the end of the socket, being held there by a nut, which fits upon the screw or screwed pin. The invention also consists in a tap having at one end a slot, corresponding with and fitting the tongues upon the hollow conical plug. Upon the outer surface of the same end of the tap there is a groove, into which a ring of india-rubber is placed.

3133.—WILLIAM THOMAS SUGG, of Vincent Works, Vincent Street, in the city of Westminster, for "*Improvements in apparatus for regulating the supply of gas and in fittings connected therewith, which are also applicable to other purposes.*" Patent dated Oct. 13, 1868.

This invention has reference, in the first place, to further improvements in apparatus for regulating the supply of gas, and for which letters patent, No. 2277, bearing date Sept. 5, 1866, were granted to the present patentee. The action and general arrangement of the apparatus is similar to that described in the specification of the letters patent before alluded to, but the method of securing the flexible diaphragm in its place is different, and consists in forming a metal ring with three, or more or less, inclined planes (or segments of a three, or more or less, threaded screw) upon its periphery. On the edge of the ring notches are cut, which allow it to pass over studs or projections either cast on the interior of the case or otherwise fastened to it. These studs are under-cut so as to admit of the inclined planes of the ring, when it is turned partially round, taking a bearing upon the said studs, and thus press the ring down to a shoulder in the body of the lower case, so that whatever substance is placed between the ring and the shoulder is tightly gripped thereby. Notches are cut in the upper case of the governor, which allow of its dropping over stops cast on the periphery of the ring, the object being that the cover, when put on and turned slightly round, shall press against the stops or studs on the ring, force it tightly home, and retain it there with the assistance of screws until the screws are withdrawn and the ring released by an opposite movement of the cover. It is, however, by no means imperative that the turning of the cover should be the means employed to thrust the ring home, as a triangular or other suitably-forked tool or tools may be used for the purpose. It will be obvious from the foregoing that if the flexible diaphragm be placed between the ring and the before-mentioned shoulder it will be held firmly in position until intentionally removed.

The foregoing method of securing the flexible diaphragm is applicable to governors of all sizes, whether they be used for public lamps, private consumption, or street-main use.

The invention, in the second place, relates to the construction of the "cones" or fittings attached to the top of the governor, and in which the burner is inserted. It is proposed to cast these in soft metal—that is to say, a mixture of zinc or lead, tin and antimony, or other suitable compound, to make them smooth or polished internally of a taper form, and to insert within the tube a conical or curved plug of such diameter as to leave a narrow concentric passage between it and the side of the cone for the gas to pass through, and thus distribute it uniformly to every part of the burner. This improvement may be applied to fittings generally independent of those connected with the governor before mentioned. For the purpose of facilitating the manufacture and lessening the cost of production, together with other advantages, both the soft metal rings of the governors and the cones just described are preferred to be (though not indispensably necessary) cast in polished brass, iron, steel, or other metallic moulds. When, however, the rings are too large to admit of this material and process being adopted, the ordinary method of casting or constructing must be resorted to, the general form as described being retained.

3140.—JOHN SHANKS, of Barrhead, in the co. of Renfrew, N.B., sanitary engineer, for "*Improvements in water-closets and in taps for the same, and applicable otherwise.*" Patent dated Oct. 14, 1868.

These improvements consist in forming a channel round the rim of, and in the same piece with, the earthenware or enamelled iron basin of the closet. The flushing water, entering by an inlet, is made to pass through a hollow rim, and thereby has a whirling motion imparted to it, whilst enough water will run out of it after the tap is closed to fill the basin to the desired height and seal the outlet. This simple contrivance renders any complicated "regulator" quite unnecessary, and the water-tap may be arranged to close simultaneously with the main valve, which admits of the simplest possible connexions of the working parts.

3146.—JAMES ROBERTSON, of the city of Glasgow, in the co. of Lanark, N.B., engineer, for "*New or improved modes of obtaining and transmitting motive power, and in the means, apparatus, or mechanism employed therefor, part of such apparatus or mechanism being also applicable to the measuring of fluids.*" Patent dated Oct. 14, 1868.

These improvements consist mainly in new or improved modes of generating and heating or producing fluid currents for actuating motive-power engines generally; also in new or improved modes of transmitting motive power to, in, and through, or by mechanism or engines constructed so as to have one actuating fluid of each motor introduced, forced, or injected, in the form of a jet or stream through an annular nozzle or other conduit, made so as to draw another or second fluid or fluids into and through the main duct, which is directed and applied so as to actuate the motive power engine or mechanism by its force and expansion. Also in new or improved modes of regulating the flow of the actuating or measured fluids to and from the cylinders of reciprocating motive-power engines, fluid-meters, or measuring-machines, by forming the ports in and through the working surfaces of the cylinder and piston so as to form also the induction or eduction valve or valves (with or without inducing action, or positively spent currents), and their fluid-tight working surfaces, and by giving the piston an oscillatory motion on its axis in the well-known and proper sequential time and relative position to suit that of its own longitudinal reciprocatory motion, instead of the separate slide and other valves usually employed for the like purposes.

3148.—JAMES ATKINS, of the firm of Robert Walter Winfield amd Co., of Birmingham, in the co. of Warwick, merchants and manufacturers, for

"*Improvements in the manufacture of ornamental and plain metallic tubes.*" Provisional protection only obtained. Dated Oct. 14, 1868.

In carrying this invention into effect the inner or foundation tube is made of sheet iron or other metal by cutting out or perforating the sheet metal before it is made into a tube with any desired ornamental pattern, and the perforated sheet metal is afterwards made into tubing in the ordinary way. The tube of brass, or other tube with which the foundation-tube is to be cased, is then placed upon the said foundation-tube, and the compound tube is subjected to a drawing process.

3151.—WILLIAM ROBERT LAKE, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*Improvements in apparatus for generating and burning the vapour of hydrocarbon liquids.*" A communication. Patent dated Oct. 14, 1868.

These improvements relate to that class of stoves ordinarily denominated "petroleum stoves," in which naphtha, gasoline, or other like substances, is employed as fuel for heating and cooking, and the invention consists in combining with a petroleum stove an apparatus for generating gas for illuminating purposes, the said apparatus being provided with a receptacle or meter for receiving the gas as it is produced from the naphtha, gasoline, or other fuel; also in attaching a lamp-burner to the reservoir containing the said fuel. The invention also relates to certain improvements in apparatus for generating and burning gas from naphtha, chiefly for illuminating purposes, and also for heating a nursery lamp. The invention further consists in the construction of a burner fitted to the bottom of the gas-pipe, so that when the gas is lighted the jet of flame will proceed downward, or from below, instead of from the top or side of the burner.

3158.—ALFRED ROBINS, of 23, Great St. Helen's, in the City of London, for "*Improvements in the manufacture of water and drain pipes.*" A communication. Patent dated Oct. 15, 1868.

The invention relates to the manufacture of water and drain pipes of oakum, cordage, or other woven fabric or fibrous material, combined by cementing with pitch, tar, resin, asphalte, or other similar substance, and then coating the same within and without with the same material. In addition thereto a coating of brickdust, sand, coke dust, grit, or other suitable hard particles of matter, is applied as a protection to the surface.

3176.—JOHN PHILLIPS, of Hampstead, in the co. of Middlesex, civil engineer, for "*Improvements in the means or apparatus employed for warming and ventilating buildings.*" Provisional protection only obtained. Dated Oct. 16, 1868.

According to this invention the hot-water pipes conveying the upward and downward currents between a boiler below and cistern or expansion-chamber above, are enclosed within air tubes or passages, which may be placed or constructed within the partition or other walls of a dwelling-house or other building. Openings are formed into the air-tubes by preference in or near the ceiling of each room with which they communicate, through which openings the vitiated air passes into the air-tubes, and away to the outlet through the roof, a strong upward current being produced in the air-tubes by the expansion of the air therein caused by the heat evolved from the surface of the hot-water pipe enclosed within such air tube or passage.

3180.—ALEXANDRE DESBONNET, of Brussels, in the kingdom of Belgium, for "*A new lighting apparatus.*" Provisional protection only obtained. Dated Oct. 17, 1868.

The object of the invention is to construct a protecting vase in such a manner that no shade will be thrown therefrom. This is effected by constructing the body of the lantern of one piece of glass of a circular or other convenient form, and supporting it either by a ring from above or by a light tripod frame below.

3203.—GAVIN CHAPMAN, of Glasgow, in the co. of Lanark, N.B., manufacturing chemist, for "*Improvements in treating sewage in order to obtain valuable products therefrom.*" Patent dated Oct. 20, 1868.

These improvements consist in a system, comprising the precipitation of solid matters, by means of lime or other alkaline agent, and the subsequent separation of the ammonia by distillation.

3209.—DAVID POSENER and ADOLPHE POSENER, of Mansell Street, Goodman's Fields, in the co. of Middlesex, pipe manufacturers, and MARCUS UNGER, of Duke Street, Aldgate, in the City of London, ivory turner, for "*Improvements in holders for glass and other globes or shades for gaseliers, chandeliers, and other analogous purposes.*" Provisional protection only obtained. Dated Oct. 20, 1868.

This invention consists in a kind of spring catch which projects through the ear of the holder, and is pushed forward by means of a coiled spring. When the shade or glass is to be removed from the holder it will only be necessary to draw back the spring catch, and the glass can then be lifted off.

3214.—JOSEPH WESTWOOD, jun., of Tredegar House, Bow Road, in the co. of Middlesex, civil engineer, for "*Improvements in the construction of socket-joints for metal piles and columns.*" Patent dated Oct. 20, 1868.

In constructing these improved socket-joints a tube of wrought iron or steel is formed, either by bending a plate of such metal and welding its edges together; or by coiling a bar of the same upon a mandrel, and then welding it; or by welding together a series of rings or hoops of the required diameter. The interior of the socket or tube is bored, or otherwise formed to fit the ends of the sections of the pile or column to be united. The socket may then be heated, and tightly shrunk upon one of the sections. The end of the section to be united or coupled to this section is then inserted into the socket, the two ends being preferably made to butt together. Holes are then drilled through both the socket and the pile, into which are inserted keys, pins, or bolts, which may be riveted or otherwise secured.

3216.—JOHN STAFFORD, of 8, Phœnix Street, Somers Town, in the co. of Middlesex, for "*Improvements in chimney terminals, also applicable to ventilators.*" Provisional protection only obtained. Dated Oct. 21, 1868.

These improvements consist in constructing a cylindrical or polygonal tube, on the external surface of the upper end of which are fixed or formed a number of long vertical blades, arranged round the tube, and having a curved transverse section, the convex surface being presented towards the interior of the tube. These blades are of such a width that spaces intervene between the edges of each two, forming long narrow openings, which are covered by a corresponding number of other curved blades or shields, the concave surfaces of which are presented towards the openings, being situated a short distance from the same, while the edges of such shields overlap the hollow surfaces of the first-named blades in such manner as to leave other long narrow openings between such edges of the outer shields, as also between these and the concave surfaces of the inner blades.

3230.—MARC ANTOINE FRANÇOIS MENNONS, of the firm of Mennons and Telescheff, of 96, Newgate Street, in the City of London, and 51, Rue de la Chaussée d'Antin, Paris, in the empire of France, home and foreign patent agents, for "*An improved engine for raising and forcing water.*" A communication. Patent dated Oct. 22, 1868.

This improved engine consists of a cast-iron chamber, constructed by the union of castings by bolts. There is a diaphragm of twisted cotton ducts of six or more layers held between two iron plates, which are connected with the valve-stem, which is provided on its lower end with a nut. There is also a pipe for the conveyance of steam into the chamber, and a cast-iron base secured to a bowl by bolts. There is a tube, the upper end of which is used as a valve to close against the seat, and a spiral spring is set in this tube. An outlet-tube provided with a check-valve, to prevent return of water, furnishes a ready outlet for the water. There is a tube leading from one tube to the injector, provided with a valve. The exhaust air and hot water escape leads from the hot well, and is provided with a valve.

3241.—WALTER WILLIAM TONKIN, of 141, De Beauvoir Road, Kingsland, in the co. of Middlesex, engineer, for "*Improvements in the valves of engines or pumps.*" Provisional protection only obtained. Dated Oct. 23, 1868.

These improvements consist in certain methods of constructing pistons or slide-valves, whereby the necessity heretofore existing of maintaining a constant pressure, always acting in one direction, upon a small area, which is periodically overcome by a pressure acting in an opposite direction upon a larger area, is obviated.

3260.—HENRY EDWARD NEWTON, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in steam-pumps.*" A communication. Patent dated Oct. 24, 1868.

This invention relates to the kind of pumping-engine known as direct and double acting. The main valve is worked by the direct action of steam, admitted and exhausted therefrom, by the action of auxiliary valves, which derive their motion in one direction from the steam piston, and in the other by the action of the steam and by gravitation.

3273.—WILLIAM EDWARD GEDGE, of the firm of John Gedge and Son, of 11, Wellington Street, Strand, in the co. of Middlesex, patent agent, for "*An improved gas-burner.*" A communication. Patent dated Oct. 26, 1868.

The difference between this burner and other burners of this kind consists in its receiving gas through the middle and air from beneath or at the sides with the object of altogether doing away with the branches and the solderings or brazings which considerably increase the cost of manufacture, especially if the largest possible holes or circular outlets, more or less broad, may be pierced in the burner according to the degree of light required. The practical result of this new method is that the gas arrives at the orifice of the burner without pressure, the flame is no longer subject to wavering, and the blue which is an obstacle to the brilliancy of the light disappears by means of the total consumption of the gas. The novel shape of burner and system of gas and air supply constituting this invention may be applied to every kind of gas-burner, and this invention may be clearly defined as a direct gas supply or as a supply of air from the sides or beneath the burner for the interior of the nipple.

3282.—AMBROSE HUDD SMITH, of 7, Mall Place, Clifton, in the co. of Gloucester, plumber and gas-fitter, for "*Improvements in the method of and apparatus for warming and heating churches, chapels, and other buildings.*" Patent dated Oct. 27, 1868.

In carrying out this invention a square chamber is constructed of bricks, fire-clay, or any other suitable material. By means of an air-shaft a current of air is introduced to act upon a series of ring burners. Underneath these burners, or above, according to circumstances, a water-cistern made of fire-clay is employed. This cistern reaches above and below the burners; the top of this water-cistern is filled with pumice stone, and the whole of this is enclosed within a bottle-shaped cylinder made of fire-clay. Over the top of this cylinder a dome is placed, which is likewise made of fire-clay, moveable or fixed. The whole of this apparatus is covered with an iron grating, fitted flush with the floor. The burner is supplied from an ordinary main, and lighted according to circumstances. This invention can be applied to an ornamental case, and fixed in any position above the floor, as may be required.

3287.—GUSTAV FAJEN, of Leighton Road, Kentish Town, in the co. of Middlesex, engineer, for "*Improvements in ventilators or smoke-exhausters, applicable to chimneys of dwelling-houses and other similar buildings.*" Provisional protection only obtained. Dated Oct. 27, 1868.

This invention consists of an apparatus made to the size of the internal part of a chimney, flue, or other opening of a circular, oval, or square construction. The apparatus is made of sheet iron, galvanized block tin, zinc, copper, or brass. On the external part there are steel springs fixed, of an elongated or globular shape; there are flaps or metal doors fitted, and hung on hinges. The action of the springs on the flaps or doors is of sufficient power to hold the apparatus in position when placed in such chimney, flue, or other opening. The internal part of the apparatus is fitted with a fan, screw, or worm, made of metal, and of any desired diameter, pitch of screw, or elevation thereof. This fan, screw, or worm is provided with a steel spindle, fixed in the centre, with glass bearings fitted on, which it will rotate either in a vertical, horizontal, or in an elevated position.

3314.—HENRY WALLWORK, of the city of Manchester, in the co. of Lancaster, ironfounder and engineer, for "*Improvements in taps or valves.*" Patent dated Oct. 29, 1868.

This invention relates principally to self-closing valves or taps, and consists in the construction, arrangement, and combination of the parts. The valve is a lifting-valve, and closes by the pressure of the liquid. The stem part, which guides its movement, is formed with grooves or channels in the ordinary manner, or it is made tubular, and holes are formed laterally in its upper part to allow the fluid to pass into and through the hollow stem. The seating of the valve is flat, and the facing of the valve (corresponding to the cone part of the ordinary valve) is formed by a ring of india-rubber, leather, or other suitable material. The head of the valve is coned. It is lifted when opened by the end of a lever-handle acting against the end of the stem of the valve, this lever-handle passing through a cylindrical or cone plug fitting a hole formed in the body part of the tap.

3321.—SAMUEL SHARROCK, of Liverpool, in the co. of Lancaster, engineer, for "*Improvements in lamp-posts.*" Patent dated Oct. 30, 1868.

This invention has for its object improvements in lamp-posts. For this purpose a taper tube is employed, formed of a sheet or sheets of wrought iron, bent round, and with the edges riveted together along the side of the tube; stays or hoops are also fixed in these posts, to strengthen them at

points where they would be liable to collapse. The post at its lower end may be inserted directly into the ground or into a socket of cast iron, or an ornamental base for the post may be formed of cast iron; this base rests on the surface of the ground, and the post passes through it. The base serves to steady the post as well as to give it a more ornamental appearance. The top of the post receives a socket which carries the lantern, or a lantern may be attached in any other way. In some cases the posts are made in two lengths, which are connected by inserting one into the other, and so fixing the ends in a socket-joint, which is strengthened by a wrought-iron plate bent and riveted in a tubular form.

3324.—JULIUS BRÖNNER, of Frankfort-on-the-Maine, in the kingdom of Prussia, manufacturer, for "*An improved construction and application of shades to gas-lights.*" Patent dated Oct. 31, 1868.

This invention consists in so constructing a shade that, when applied to a gaslight, the jet shall burn at a certain regulated distance from a vertical or nearly vertical plane, the expansion of the flame being parallel therewith. The effect of this construction and arrangement is, that this flat vertical side of the shade becoming heated, a perpendicular current of hot air is produced, steadying the flame, and doing away with the wavering so injurious to the eye, and to which the flame from bat's-wing and fishtail burners is specially subject.

3341.—SIGISMUND SCHUMAN, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in treating and utilizing fæcal matters, and in the apparatus employed therefor.*" Provisional protection only obtained. Dated Nov. 3, 1868.

In carrying this invention into operation with the existing system of water-closet, the pipe or shaft leading from the pan of the closet is contracted at its lower end, and connected to a porous or perforated receptacle, formed by preference of straw basket-work, felted or other similar substance, knitted or woven, the lower part of which is in communication with a lower receptacle or reservoir. As soon as the fæcal matter and water are discharged from the closet, these fall into the porous or perforated receptacle, and the liquids, water, and urine drain through into the receptacle below. The lower receptacle is connected by a pipe with a large district reservoir, into which the urine, water, and all matter mixed with the fluids are discharged, and in which they are evaporated at the natural temperature, or by artificial heat, and the product separated from the refuse or water portions, or the liquid portions may be pumped off into moveable tanks, and afterwards discharged and disinfected, whilst the solid matter is retained in the porous or perforated receptacle, which is so fitted as to be capable of easy removal and replacement by attendants provided for the purpose.

3348.—ALFRED VINCENT NEWTON, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*Improvements in atmospheric water-elevating engines.*" A communication. Provisional protection only obtained. Dated Nov. 4, 1868.

This invention consists, first, in constructing water-elevating engines with a double cylinder—that is to say, an upper and a lower cylinder, the latter of which is, properly speaking, the condensing cylinder. The invention also includes certain devices for condensing the steam (which is let into the upper cylinder to destroy the vacuum, and allow the water to fall to the level of the discharge-valve) by the momentum of the falling water, which enables it to pass through a floating piston of the upper cylinder into the water in the condensing cylinder.

3363.—AUGUSTUS LEA BRICKNELL, of Stratford-upon-Avon, in the co. of Warwick, for "*Improvements in apparatus applicable as a rotary engine-pump and water-meter.*" Patent dated Nov. 5, 1868.

This invention, which relates to a former patent (No. 1671, June 7, 1867), and consists in constructing rotary engines by casting the cylindrical centre-piece in one piece upon its shaft, and afterwards turning it truly, and slotting out the recesses for the pistons, or forming the recesses by casting the metal around boxes of sheet steel or iron, or introducing metal cores or chills into the casting to produce the recesses, which are drawn out as soon as the casting is set. In some cases, in place of the metal cores, sand cores are used, moulded in an iron box, made for the purpose with great accuracy and truth. In order to give more strength to the cylindrical centre-piece, it is hooped with wrought iron around the flanges, which are prepared to receive the hoops by turning them slightly hollow. For engines of small size, a white metal alloy is used in place of cast iron for casting the centre-piece. The alloy fluid most advantageous consists of nine parts of zinc and one part of tin, or thereabouts.

3366.—ARTHUR HENRY ROBINSON, of Clyde Road, in the co. of Dublin, engineer, for "*Improvements in cocks or taps.*" Provisional protection only obtained. Dated Nov. 6, 1868.

According to this invention the body of the tap is provided with three branches, one leading direct from the main, and provided with a spherical or other valve, composed of cork, vulcanized india-rubber, metal, or other suitable material, for opening and closing the communication; another leading to the rising main for supplying the house-cistern, and the third affording the requisite supply for ordinary domestic purposes as may be required. The valve is opened by a rod or spindle, which passes through an opening in the front of the tap, and is connected to an internal screwed cap, which screws on to an external screwed boss forming part of the body of the said cap, being provided with the usual crutch for turning the same.

3383.—JOHN LEWTHWAITE, of Woburn Place, in the co. of Middlesex, for "*Improvements in apparatus for boring and working in rock, stone, or earth, applicable to sinking artesian and other wells, to mining, and other purposes.*" Patent dated Nov. 7, 1868.

This invention mainly consists in the employment of a guide-cylinder for the bar of the boring-tool to work through, whereby friction is greatly diminished, and the operator enabled, with more expedition and at less cost and labour, to bore or cut through rock or stone in sinking artesian and other wells, and in boring holes for mining and other purposes. The guide-cylinder for vertical boring is suspended by means of a bridle-link or other attachment, connected to a rope or chain, carried up to above the surface of the ground.

3392.—WILLIAM CORDEN, of Datchet, in the co. of Bucks, artist, for "*Improvements in lamp-globes or glasses.*" Patent dated Nov. 7, 1868.

The object of this invention is to so construct lamp-globes and glasses as to concentrate the light from a burner all around, below the level of the light, whilst at the same time the direct passage of heat is arrested; also to afford facilities for making the light of any agreeable colour; and also to render the air of a room more agreeable by the evaporation of water. For this purpose a double cup-like glass is employed, with a space between the two cups, which is filled with water. The outer cup is approximately a portion of a sphere, and the inner cup may also be of a similar form, or in some cases be made simply cone or funnel shaped. The inner cup is, by preference, composed of a series of plain or slightly concave surfaces rounded at the angles. The water filled into the space between the two cups prevents the transmission of heat downwards, and becomes slightly heated and slowly evaporates, thereby moistening the air, which in brightly lighted rooms is frequently unpleasantly dry.

3403.—HENRY LEONARD BENNISON, of Greenwich, in the co. of Kent, engineer, for "*Improved rotary engine and pump, to be driven by water or steam power.*" Patent dated Nov. 10, 1868.

This invention consists in constructing the engine with a four-way cock, for working supply and exhaust or waste, and in the special construction of the cock, by so altering the form of the section of the passage-way of each arm in the length of the arm, and proportioning the ways through the plug as to avoid the construction which ordinarily occurs in four-way cocks. With this object the form may be circular at the extremities of the arms, and thence taper or change up to the plug-seat, where the size may be diminished as presented against the cross section of the plug, and enlarged in the direction of the side or length of the plug, which it is believed will afford the means of constructing the cock with a plug of less diameter than heretofore, and though it may be only partialy opened to admit steam, water, air, &c., will allow of a free and rapid exhaust.

3407.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, gentleman, for "*A mode of and means for utilizing the waste heat of furnaces employed in the manufacture of coal gas.*" A communication. Provisional protection only obtained. Dated Nov. 10, 1868.

This invention has for its object the application and utilization of the waste heat of the furnaces employed for heating the retorts used in the manufacture of coal gas to the formation of steam, for the working of pumping-engines for supplying towns with water, whereby considerable economy of fuel is obtained; and the water supply of the town or other locality, by being thus carried out in conjunction with the production of the illuminating gas for the same town or locality, may be more economically conducted than heretofore.

In carrying out this invention a peculiar arrangement of the flues of the steam-boiler which works the pumping-engine is required, such flues being so arranged as to admit either of the conjoint use of direct heat from the boiler furnace and of the waste heat from the gas-retort furnaces, or of the waste heat alone, as may be found requisite at different seasons of the year. For example, in summer, when more water will be required to be pumped into the town, there will be less gas made, and hence less waste heat available; consequently, recourse must be had to direct heat from the boiler furnace itself as an auxiliary, whereas in winter the amount of available waste heat will be materially increased, and may even be sufficient to generate the steam without the use of direct heat from a special furnace under the boiler. The direct heat, when employed, passes from the furnace through a number of tubular flues in the generator, and then mingles with the waste heat from the gas-retort furnaces, which traverses along external flues, to and fro along the length of the boiler side, and finally passes off to a chimney or uptake. If desired, a small supplementary steam-generator or superheater may be placed in one of the external flues. When no direct heat is employed, the communication between the flues or passages may be varied by the aid of dampers, so as to direct the waste heat first through the boiler-tubes, and then to and fro along the external sides of the generator or boiler.

3457.—CHARLES JONES, of Ealing, in the co. of Middlesex, surveyor, for "*Improvements in the treatment of sewage.*" Patent dated Nov. 13, 1868.

This invention consists in effecting the precipitation or deodorization of sewage, by the use of slaked lime, combined or mixed with hydrocarbons—such, for example, as petroleum—or with the acid tar or residual product obtained in the treatment of tars, for and in the production of oils or other liquid hydrocarbons. Such mixture or compound is introduced into the sewage just before it falls into a depositing tank. By this means results are obtained as thoroughly satisfactory as by the more expensive salts hitherto used.

3464.—ROBERT BECKLEY, of Richmond, in the co. of Surrey, and JAMES JOSEPH HICKS, of Hatton Garden, in the co. of Middlesex, for "*Improvements in means or apparatus for measuring and registering the quantities of flowing liquids, which invention may be used as a rain-gauge or as a liquid-meter, and for measuring the strength of liquor run off from a still or other apparatus or vessel.*" Patent dated Nov. 14, 1868.

The apparatus constructed according to this invention is as follows:—The rain is conveyed to a measuring-chamber, which is supported by a float working in a chamber having a suitable quantity of quicksilver therein. Through the bottom of the measuring-chamber is passed the longer leg of a syphon, the shorter leg of which nearly touches the bottom, whilst the bend of the syphon is coincident with the top of the measuring-chamber, and is contracted so as to ensure the rain passing away from the measuring-chamber by the longer leg of the syphon at a practically uniform level. The measuring-chamber rises and falls according to the quantity of rain it contains, and is guided in its motion so as to ensure its rising and falling in a vertical line, and prevent its turning on its axis.

3477.—HENRY CARTER, of Manchester, in the co. of Lancaster, for "*An improved apparatus to be employed for exhibition purposes in connexion with gas-burners.*" Provisional protection only obtained. Dated Nov. 16, 1868.

This is an application to gas-burners of the well-known "hydrocarbon" burner, and the improvements consist in supporting or attaching to one end of a balanced lever the hydrocarbon burner, which consists of a flattened piece of metal that is constructed to slide upon and fit the ordinary gas-burner, so as to divide the flame opposite the end of the lever to which the piece of metal is attached. The latter is connected by a rod to an eccentric crank, or other equivalent, that is caused slowly to revolve through the medium of a coiled spring and wheels, similar to the works of a clock, the revolving of which transmits a rising and falling motion to the hydrocarbon burner, which, when in its lowest position, rests upon and divides the flame of the gas-burner; and, when raised and free from the burner, leaves the flame of gas to burn in the ordinary manner.

3484.—ANDREW M'NIEL, of Tiverton, in the co. of Devon, engineer, and WILLIAM WHEATON, of Exeter, in the same co., merchant, for "*An improved process for the manufacture of salts of ammonia from ammoniacal gas liquor.*" Patent dated Nov. 16, 1868.

This invention refers to a process for obtaining sulphur salts of ammonia from ammoniacal liquor, more particularly that obtained in the manufacture of gas, the principal object being to obtain the ammonia in such a form and

combination that it may be used as a manure. The inventors take the ammoniacal liquor as it comes from the gas-works, and add thereto a compound of earthy matters, of which gypsum or impure sulphate of lime (as obtained in the raw state) and chloride of sodium, or common salt, form principal ingredients. Gypsum or sulphate of lime, when added to ammoniacal liquor, becomes decomposed, and the acid contained in the gypsum combines with a portion of the ammonia and forms sulphate of ammonia and hydrosulphuret of ammonium; but it has been found that sulphate of lime alone will not be sufficient to take up or disengage all the ammonia contained in the liquor.

3522.—EDWARD HODSON BAYLEY, of 42, Newington Causeway, in the borough of Southwark, in the co. of Surrey, wheelwright, for "*Improvements in carts or other vehicles for the removal of snow from streets, roads, and other places, and in apparatus connected therewith for melting the said snow and disposing of the water thus produced, the said carts being able to be applied, if required, to other useful purposes.*" Provisional protection only obtained. Dated Nov. 20, 1868.

These improvements consist of the combination of a furnace and snow-melting apparatus with a cart or other vehicle, which may or may not be used as an ordinary water-cart. A wrought-iron tank is raised on wheels, say four in number, and has shafts or a pole fitted thereto, together with a seat for the driver, as in ordinary water-carts. At the top of the cart, and constituting the whole of its upper surface, except the seat for the driver, is a hopper, or other suitable receptacle, for the snow as it is delivered from the shovels or hods of the scavengers. The hopper is divided into two parts—an upper and a lower chamber—by means of a sieve or perforated plate, which prevents the entrance of stones and other foreign bodies into the lower chamber.

3531.—HENRY BRIDGE COWELL, of 4, Compton Street, Balls Pond, Islington, in the co. of Middlesex, for "*Improvements in apparatus for the distribution of water or other liquids in fine particles, which apparatus is also applicable in the distribution of fine particles in powder.*" Provisional protection only obtained. Dated Nov. 20, 1868.

According to this invention the water to be distributed is placed in a trough in which is supported the axis of a rotary brush, or a series of brushes, by the rotation of which, by a handle or otherwise, the matter in the trough is taken up, and then, by the edge of a plate, which may be capable of adjustment in bearing upon the surface of such brush as it revolves, the matter so taken up from the trough is spirted or thrown forwards in quantities dependent on the position of the edge of the plate in bearing upon the brush.

APPLICATIONS FOR LETTERS PATENT.

2534.—HENRY PALFREY STEPHENSON, of 15, Abingdon Street, in the city of Westminster, civil engineer, EUGENE GEORGE BARTHOLOMEW, of 1, Chepstow Villas, York Road, Upper Holloway, in the co. of Middlesex, civil engineer, and ROBERT KING, of 8, St. Mary Axe, in the City of London, civil engineer, for "*Improvements in lighting and extinguishing gas-lamps.*" Aug. 26, 1869.

2561.—JOHN LOADER, of Upper Clifton Street, Worship Square, in the co. of Middlesex, for "*Improvements in rotary engines and pumps.*" Aug. 28, 1869.

2604.—JAMES GASCOIGNE LYNDE, of Manchester, in the co. of Lancaster, civil engineer, for "*A diaphragm indicator especially adapted for water and other meters.*" Sept. 4, 1869.

2648.—JAN ANTHONY MULLER, of Amsterdam, in the kingdom of Holland, at present of 123, Chancery Lane, in the co. of Middlesex, for "*Improvements in apparatus for measuring and registering the flow of water and other liquids, part of which improvements is applicable to measuring and registering the flow of gases.*" Sept. 8, 1869.

GRANTS OF PROVISIONAL PROTECTION.

1683.—HENRY HOLDREGE, of the city and state of New York, U.S.A., gas engineer, for "*Improvements in the process of making gas for illuminating, heating, and other purposes, and in apparatus for the manufacture thereof.*" Partly communicated. May 31, 1869.

2313.—PAUL RAPSEY HODGE, of 10, Adam Street, Adelphi, in the parish of St. Martin's-in-the-Fields, in the co. of Middlesex, civil engineer, for "*Certain improvements in the manufacture of luminous and heating gas from hydrocarbonaceous fluids, and in the methods of using and applying such gas for illuminating and heating purposes.*" Aug. 2, 1869.

2395.—SAMUEL JOSEPH WOODHOUSE, of Holbeck, Leeds, in the co. of York, gas inspector, for "*Improved apparatus for purifying and regulating the supply of gas to burners, and also for an improved standard tap.*" Aug. 10, 1869.

2445.—HENRI ADRIEN BONNEVILLE, of 10, Sackville Street, Piccadilly, in the co. of Middlesex, patent agent, for "*Improvements in the process of charging and discharging fuel in gas-retorts or other gas-distilling apparatus.*" A communication. Aug. 16, 1869.

2463.—JOSEPH PRATO and FRANCIS POLACCO, of Great Winchester Street, London, for "*Improvements in charcoal filters for purifying water or other liquids, likewise in the mode of applying the same.*" Aug. 18, 1869.

2478.—ARCHIBALD GILCHRIST, of Glasgow, in the co. of Lanark, N.B., engineer and shipbuilder, for "*Improvements in slide-valves.*" Aug. 19, 1869.

2482.—FREDERICK BRABY, of Fitzroy Works, Euston Road, in the co. of Middlesex, for "*Improvements in the means and apparatus for the manufacture of caustic ammonia and ammoniacal salts.*" Aug. 19, 1869.

2491.—HENRY JAMES HOGG KING, of Glasgow, in the co. of Lanark, N.B., engineer, for "*Improvements in apparatus for measuring, indicating, and regulating the flow or passage of liquids.*" Aug. 20, 1869.

2508.—WILLIAM ROBERT LAKE, of 8, Southampton Buildings, London, consulting engineer, for "*Improvements in apparatus for raising and forcing water, and for obtaining motive power.*" A communication. Aug. 23, 1869.

2509.—WILLIAM ROBERT LAKE, of 8, Southampton Buildings, London, consulting engineer, for "*Improvements in posts or standards for gas-lamps.*" A communication. Aug. 23, 1869.

2561.—JOHN LOADER, of Upper Clifton Street, Worship Square, in the co. of Middlesex, for "*Improvements in rotary engines and pumps.*" Aug. 28, 1869.

NOTICES TO PROCEED.

1683.—HENRY HOLDREGE, of the city and state of New York, U.S.A., gas engineer, for "*Improvements in the process of making gas for illuminating, heating, and other purposes, and in apparatus for the manufacture thereof.*" Partly communicated. May 31, 1869.

1858.—BRISTOW HUNT, of 1, Serle Street, Lincoln's Inn, in the co. of Middlesex, gentleman, for "*An improved apparatus for ventilating and purifying rooms or apartments.*" A communication. June 16, 1869.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

2183.—JOSIAH GEORGE JENNINGS, "*Improvements in water-closets, urinals, and taps.*" Aug. 24, 1866.

2206.—Rev. THOMAS DAVIS, "*An improved method of or apparatus for ventilating dwelling-houses or other buildings.*" Aug. 27, 1866.

2218.—ROBERT IRVINE, "*Improvements in treating and purifying water.*" Aug. 28, 1866.

PATENT WHICH HAS BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2380.—WILLIAM EDWARD NEWTON, "*An improved method of producing light for the various purposes of artificial illumination.*" Aug. 27, 1862.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle and Middlesboro'.	Wales.	Yorkshire, Derbyshire, and Staffordshire
	£. s. d.	£. s. d.	£ s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	5 15 0	2 10 9	3 4 0	3 0 0	3 10 0
1¼ and 2-inch Socket-pipes	7 0 0	5 15 0	5 10 0	6 0 0	7 0 0
2½ and 3-inch ditto	6 10 0	5 5 0	5 0 0	5 15 0	6 10 0
4 and 5-inch ditto	6 0 0	4 15 0	4 10 0	5 5 0	6 0 0
6 inches and upwards ditto	5 15 0	4 5 0	4 0 0	5 0 0	5 15 0
Retorts, 1st fusion, hot blast	5 10 0	4 10 0	4 5 0	5 0 0	5 10 0
Ditto, 2nd ditto, cold ditto	6 10 0	—	—	—	6 10 0
Tank-plates, ¼ thick and above	6 0 0	5 0 0	4 15 0	5 10 0	6 0 0

WROUGHT-IRON TUBING,

Subject to 50 per cent. Discount.

	2 in.	1¼ in.	1½ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 14 feet—per foot	1 8	1 1	0 10	0 7	0 5	0 4½
Ditto ditto, from 12 in. to 23½ in.—each	3 0	2 0	1 6	1 1	0 9	0 8
Long Screws, from 12 in. upwards	4 0	2 3	2 0	1 6	1 2	0 11
Bends and Springs	4 3	2 3	1 9	1 3	0 11	0 8
Square Elbows, equal or reducing; Round Elbows, 5 per cent. extra	3 9	2 3	1 9	1 3	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 9
Crosses, ditto, equal or reducing	4 9	3 6	3 0	2 3	1 9	1 6
Iron Cocks	20 9	13 0	10 0	7 3	5 0	3 8
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 9	0 8	0 6	0 5	0 4½
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2-quart	15 0	14 0	13 6	13 0	12 0	—

GAS COALS.—*Per Ton.*

Newcastle.—Unscreened:—

	s. d.
Haswells, Nettlesworth Primrose, and South Pelaw	6 6
Pelling, Framwell Gate, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	6 9
Burnhope, Craghead, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	7 0
Peareth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	7 3
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, Pelton, South Peareth, Stella, Urpeth, Washington Hutton, and West Leverson	7 6
Ramsay's Newcastle Cannel	16 0
Wigan Cannel (at Liverpool)	17 0
Scotch Cannel:—	
Boghead—at Bo'ness, 38s.; at Leith	38 8
Muirkirk	27 0
Kirkness, best (at Burntisland)	28 6
Capeldrae, 1st quality (at ditto)	28 6
Ditto, 2nd ditto (at ditto)	18 6
Cowdenbeath	12 0
Lesmahago (at Glasgow)	31 6
Ditto (at Granton)	32 6
Arniston	27 6
Wemyss, f.o.b.	22 6
Haywood, Wilsontown (at Granton)	23 0
Pirnie, or Methill	17 0
Lothian's Cannel (f.o.b. at Leith)	26 0
Bo'ness Cannel (at Bo'ness)	19 0
Myles' Cannel	22 6
Lochore Parrot (at Burntisland)	28 0
Lanemark (at Glasgow)	16 0
Elphinstone Tower (at Leith)	20 0
Coppa Cannel (on rails at Birkenhd.)	14 9
Ditto ditto (ditto at Connah's Quay)	14 3

FREIGHTS.

Coastwise—Newcastle.—Per Ton:—

	s. d.
Chatham and Rochester	5 0
Cork	7 6
Dover, Folkestone, and Ramsgate	5 9
Dublin	8 6
Exeter Quay	8 0
Ipswich	4 6
London (from Leith)	8 0
London (Pool)	5s. 1½d. to 5 3
Lowestoft and Yarmouth	4 6
Portsmouth and Southampton	6s. 3d. to 6 9
Plymouth	7 3
Shoreham	6 0
Whitstable	5 3
Weymouth	7 0
Foreign.—Per Keel:—	£ s.
Barcelona	19 0
Bordeaux	11 10
Boulogne and Calais	£6 6s. to 6 10
Cadiz	11 0
Cronstadt	14 0
Copenhagen	£8 10s. to 8 15
Genoa	18 5
Hamburg	7 5
Havre de Grace	7 17 6
Leghorn	18 10
Lisbon	11 15
Rotterdam	6 17 6
Stettin	9 10
Trieste	£18 10s. to 17 0
Venice	20 0

SUNDRIES.

	£ s. d.
Best Newcastle Fire-bricks, per 1000	£2 10s. to 2 15 0
Cliff's Fire bricks (at Wortley), per 1000	2 15 6
Ingham's do. (at Wortley), p. 1000	2 15 0
Farnley Iron Co.'s Fire-bricks (at Wortley), less discount	2 17 0
Fire-clay Retorts, p. ft. run	5s. 6d. to 0 7 6
Tough Cake Copper, per ton	72 0 0
English Pig Lead, per ton	19 0 0
Welsh Bar Iron (in London), p. ton	6 15 0
Foreign Spelter, per ton	20 12 6
English Block Tin, per ton	123 0 0
Banca, per ton	135 0 0
Tarred Rope Yarn, p. cwt	1 0 0

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Price per Share.
	£		£ s. d.	£ s. d.	£
8000	10	Anglo-Romano	10 0 0	10 0 0	11 — 12
5000	20	Bahia (Limited)	20 0 0	3 0 0	10 — ..
1000	20	Do., preference	20 0 0	10 0 0	24 — 25
750	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	4 0 0	4⅜ — 4⅝
10000	5	Do., third issue	4 0 0	4 0 0	4 — ..
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge, & Holywell.)	20 0 0	10 0 0	30 — 31
12000	50	*Chartered*	50 0 0	4 5 0	46 — 46½
6060	50	Do.	45 0 0	4 5 0	41 — 41½
10000	20	*City of London*, A shares	20 0 0	9 0 0	23 — 24
10000	10	Do., B shares	10 0 0	4 0 0	6¾ — 7
9629	10	Do., new shares	10 0 0	9 0 0	11 — 12
17490	25	*Commercial*	25 0 0	10 0 0	35 — 36
20000	20	Continental Union	20 0 0	5 0 0	24½ — ..
5213	20	Do., preference	20 0 0	7 0 0	23 — ..
5000	10	*Crystal Palace District*	10 0 0	10 0 0	13½ — 14
5000	10	Do., preference	10 0 0	6 0 0	12½ — 13
10000	10	Do., new shares	10 0 0	7 0 0	10½ — 11
4000	50	*Equitable*	50 0 0	10 0 0	68 — ..
4000	25	Do., new shares	25 0 0	10 0 0	32½ — 33
23406	10	European (Limited)	10 0 0	11 0 0	15 — 15⅝
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	7½ — 7¾
20000	10	*Great Central Gas Consumers*	10 0 0	..	12 — ..
5000	10	Hong Kong (Limited)	10 0 0	6 0 0	8 — 10
26000	50	*Imperial*	50 0 0	10 0 0	75 — ..
26000	10	Do., new shares	4 0 0	10 0 0	6¾ — 7
26000	12½	Do., new shares	12 10 0	7 0 0	13 — 13⅛
1300	100	Do., bonds	£100	10 0 0	175 —180
28000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	16 0 0	114¼ — ..
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	51 — 53
3000	10	Do.	10 0 0	5 0 0	7 — 8
3000	20	Do.	15 0 0	7 10 0	15 — 16
7133	50	*London*	50 0 0	10 0 0	71 — ..
5610	25	Do., 1st preference	25 0 0	6 0 0	26 — 28
503	50	Do., 2nd preference	50 0 0	6 0 0	
214	50	Do., 3rd preference	50 0 0	6 0 0	
£18781		Do., 1st preference stock		6 0 0	
£11828		Do., 2nd preference stock		5 0 0	
		Nictheroy, Brazil (Limited)			
15000	5	Malta and Mediterranean (Limited)	5 0 0	3 10 0	3½ — 4
6000	5	Do., preference	5 0 0	7 0 0	4⅞ — 5⅛
30000	5	Oriental (Calcutta)	5 0 0	10 0 0	7⅝ — 8
30000	5	Do., new shares	1 0 0	10 0 0	1⅜ — 1⅝
10000	5	Ottoman (Limited)	5 0 0	nil.	1⅝ — 2⅛
12500	10	Pará (Limited)	10 0 0	7 10 0	8½ — 9
27000	20	*Phœnix*	20 0 0	10 0 0	27⅞ — ..
3600	100	Do., new	35 0 0	7 10 0	36 — 36½
144000	8k.	Do.	100 0 0	5 0 0	73½ — 74½
5000	20	*Rateliff*	20 0 0	10 0 0	23 — 24
	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	24¼ — 24½
6959	5	Singapore (Limited)	5 0 0	4 0 0	
2000	5	Do., preference	5 0 0	7 10 0	
		Shanghai			
4800	50	*South Metropolitan*	50 0 0	10 0 0	73 — 75
4800	12½	Do., new shares	12 10 0	10 0 0	18½ — 19
15000	10	*Surrey Consumers*	10 0 0	10 0 0	13½ — 13⅝
10000	10	Do., new	6 0 0	10 0 0	8½ — ..
9000	4	United General (Limerick)	4 0 0	5 0 0	2 — 2½
10000	10	*Victoria Docks*	5 0 0	6 0 0	
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	10 — 12
1500	10	Do.	10 0 0	7 10 0	
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	5 0 0	7 10 0	
20000	10	Western (Limited) A shares	10 0 0	10 0 0	15½ — ..
10000	10	Do., B shares	7 0 0	10 0 0	9½ — 10
10000	10	Do., C shares	7 0 0	10 0 0	9½ — 10
20000	10	Do., D shares	1 0 0	10 0 0	1½ — 2
8000	5	*West Ham*	7 0 0	7 10 0	7⅛ — 7¼
6000	5	Do., new shares	7 0 0	7 10 0	
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

Advertisements.

TO MANAGERS OF GAS-WORKS, GAS-FITTERS, AND OTHERS.

WANTED, by a thoroughly practical gas-fitter and brass-finisher, a permanent place. Aged 29. First-class references.
W. F., 116, New North Road, Hoxton, N.

WANTED, immediately, a Working FOREMAN for the Gas-Works, Newton-in-Mackerfield, Lancashire. He must thoroughly understand making and purifying gas, laying mains, services, and all other details of a gas-work, including indices and repairs of meters, public lamps, &c. The situation is permanent to a steady, experienced person. Wages 26s. per week, with house, gas, and coals free, on the works. Security for £150 will be required.
Applications, with particulars, to be made to Richard Brierley, Engineer and Superintendent.
Town-Hall, Sept. 11, 1869.

T. RANDOLPH MELLOR (Consulting Engineer to the Oriental Gas Company) is prepared to advise Directors of Gas and Water Companies and Corporations on all subjects connected with their operations in the Manufacture and Distribution of Gas and the Supply of Water.
127, Leadenhall Street, London, E.C.

TO GAS-METER MANUFACTURERS, &c.

MR. T. B. DENHAM, many years representative to the late Thomas Glover, London, is open for an engagement as TRAVELLER. Good connexion and thorough knowledge of the trade.
Address Alexander Taylor, Bookseller, Portobello, Scotland.

A SITUATION Wanted, temporary or otherwise, by a Draughtsman accustomed to make plans and working drawings, and to take out quantities of matters connected with gas and general engineering work. Good references.
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A well-established Business, in a central position at Islington, for DISPOSAL.
For particulars, apply to Mr. C. Baker, House Agent, &c., 10, Rufford's Row, Upper Street, Islington.

TO BE SOLD, an 8-in. Governor, bye-pass valves, &c., complete; 40 ft. various lengths D Hydraulic Main, 13 in. by 12 in.; a lot of Circular Mouthpieces; Ascension, Bridge, and Dip Pipes.
Apply to A. C. Fraser, Gas-Works, Colchester.

PRICE'S PATENT LAMPLIGHTER is recommended to the notice of Gas Companies and local authorities as effecting a great saving in the consumption of Gas and of public lighting.
For particulars apply to R. E. Keen, 11, Red Lion Court, Fleet Street, London, Sole Agent. Manufacturers, D. Hulett and Co., 55, High Holborn, London.

SURREY CONSUMERS GAS COMPANY.

NOTICE is hereby given that the HALF-YEARLY ORDINARY GENERAL MEETING of the SHAREHOLDERS of this Company will be held at the Bridge House Hotel, London Bridge, Southwark, on THURSDAY, the 14th day of October next, at Three o'clock in the afternoon precisely, to receive the Directors Report for the half year ending the 30th of June last, and to declare a Dividend.
The Books for the Transfer of Shares will be closed on Saturday, the 2nd of October, until after the Meeting.
W. P. Boddy, Secretary.
Rotherhithe, Sept. 1, 1869.

CRYSTAL PALACE DISTRICT GAS COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the SHAREHOLDERS of this Company will be held at the City Terminus Hotel, Cannon Street, in the City of London, on THURSDAY, the 30th inst., to receive the Report of the Directors, the Balance-Sheet confirmed by the Auditors, to declare a Dividend, and for general business.
The Chair will be taken at half-past Three o'clock precisely. By order of the Board,
Magnus Oreen, Secretary.
Offices, Lower Sydenham, S.E., Sept. 13, 1869.

SOUTH METROPOLITAN GAS-LIGHT AND COKE COMPANY.

NOTICE is hereby given that an ORDINARY MEETING of the PROPRIETORS of this Company will be held at the London Tavern, in the City of London, on MONDAY, the 4th day of October next, at Two o'clock precisely, to receive the Directors Report, and the Accounts of the Company for the half year ending June 30 last, to declare a Dividend for the same period, and to elect a Director in the place of the late B. Edgington, Esq.
Any Proprietor holding 40 shares, intending to become a candidate, must give notice in writing at the Office of the Company, at least 14 days previously to the day of election.
By order,
Thomas Livesey, Secretary.
Old Kent Road, Sept. 11, 1869.

W. J. SIMMONDS,
Retort and Boiler Setter and Contractor for Gas-Works in general,
7B, SOUTH STREET, NEW NORTH ROAD, Islington, London, N.

Upwards of 16 years Retort Setter to the Chartered Gas Company, Brick Lane and Curtain Road Stations.
Materials supplied on reasonable terms if required, or labour only.
No connexion with any other Retort Setter.
N.B.—Orders to be addressed as above.

PURIFIERS FOR SALE.

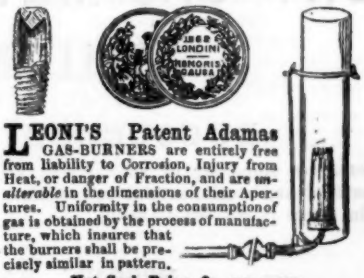
A Set of Four Cast-Iron Purifiers, 8 ft. square, with wrought-iron lids, wrought-iron centre-valve in cast-iron case, wood sieves, connecting-pipes, and lifting apparatus complete, and nearly new.
If preferred, Cockey's patent centre-valve, or cast-iron sieves, in place of above.
For particulars, apply to G. Porter, Manager, Gas and Water-Works, Carlisle.

AMMONIACAL LIQUOR.

THE Directors of the Birmingham and Staffordshire Gaslight Company are prepared to receive OFFERS for the whole of the AMMONIACAL LIQUOR produced at their works, West Bromwich, and Adderley Street, Birmingham, from the 1st day of July, 1870.
Tenders to be sent in on or before the 1st day of November next.
Particulars will be furnished on application to the Secretary.
Security will be required for the due performance of the contract. Samuel Walsh, Secretary.
Offices, 16, Old Square, Birmingham,
Aug. 24, 1869.

F. SIMMONDS, Senr.,
221, KINGSLAND ROAD,
RETORT & BOILER SETTER
For the Chartered Gaslight Company, Brick Lane and Curtain Road Stations, and numerous Gaslight Companies, London and Provincial.
NO CONNEXION WITH ANY OTHER RETORT SETTER.
Estimates given with or without materials.

UNIVERSAL PARIS EXHIBITION, 1867.
PRIZE MEDAL in Class 24—Heating and Lighting—for Leoni's Patent Gas-Burners and Gas-Stoves.



LEONI'S Patent Adamas GAS-BURNERS are entirely free from liability to Corrosion, Injury from Heat, or danger of Fraction, and are *unalterable* in the dimensions of their Apertures. Uniformity in the consumption of gas is obtained by the process of manufacture, which insures that the burners shall be precisely similar in pattern.
Net Cash Price, 8s. per gross.
Patentee and Sole Manufacturer, S. Leoni, 34, St. Paul Street, New North Road, London, N.

PATENT DRY GAS-METERS,

MANUFACTURED BY

D. BRUCE PEEBLES,

ENGINEER & GAS-METER MANUFACTURER,

FOUNTAINBRIDGE WORKS, EDINBURGH.

D. BRUCE PEEBLES having commenced a new manufacture in DRY GAS-METERS, begs to call the attention of Gas Engineers to its special advantages.

The meter-case is made of strong tinned sheet iron, which will withstand oxidation even in damp places for a very long time, and is not liable to be broken by a blow or fall, while the weight is not one-third of those in cast iron.

The construction of this meter is so simple that a few screws only are required for fitting, and it can be taken to pieces and refitted with a facility hitherto unattainable.

The jointing is novel, simple, and effectual, and is made with a minimum of cement or putty.

The whole of the working parts can be got at in a few minutes, without a soldering bolt, and can be cleaned, refitted, and set to work without the resetting of valves and levers—an operation found to be very troublesome with ordinary dry meters, and only practicable to an experienced workman. With this meter any one who can handle a screw-driver may take to pieces, clean, and refit the whole with the greatest ease.

D. B. P., while thanking the many friends and customers who now have his wet meters in use, begs to state that the same care and attention to the quality of workmanship and materials which are given to that branch will be extended to the dry meter manufacture, and he trusts by constant personal attention to merit a continuance of that patronage which already has been so liberally bestowed.

*** The 3-Light Dry Meters are now ready for delivery, and other sizes are being proceeded with as rapidly as possible.

THE FARNLEY IRON COMPANY,

FARNLEY, near LEEDS,

In consequence of the increasing demand for their Retorts, have largely extended this branch of their Fire-Clay Works, and are now prepared to execute the most important orders, either for *home* or *export*, with great punctuality.

The Fire-Clay raised from the Farnley Estate (commonly called the Wortley bed) is unsurpassed by any other known in the district, and is peculiarly well adapted for Retorts, Gas-Ovens, and Fire-Bricks; and the F. I. Co. beg especially to invite those connected with Gas-Works, who have not yet used their Retorts, to be good enough to favour them with a trial.

The F. I. Co. generally hold in stock, for immediate supply, Fire-Bricks of every size and kind—Tiles, Sanitary Tubes, Ornamental Terra-Cotta Ware White Facing Bricks, the White, Buff and Salt-Glazed Bricks, &c., &c.

Prices, Drawings, and all other information may be obtained by applying as above, or to

MR. SUTTON, THE HULL STORES, 46½, QUEEN STREET, HULL.

PATENTED MARCH 11, 1869.

IMPROVED TIN-PLATE CASED DRY GAS-METERS,

WITH SPECIAL FACILITIES FOR ADJUSTING AND REPAIRS,

The principal parts of the mechanism being accessible by the removal of a single screw.

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Consumers Wet and Dry Gas-Meters in Cast-Iron Cases, Station-Meters, Gas Apparatus, &c.

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AND EVERY DESCRIPTION OF

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FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

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MANUFACTURED BY

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(ESTABLISHED 1827,)

BUCCLEUCH STREET WORKS, EDINBURGH,

Possess a simplicity of construction and facility for repair greater than any yet produced, while the excellence of the material and workmanship, and accuracy of registration, cannot be surpassed. The superiority of their Dry Meters in Tin Cases is also well known.

SOLE MANUFACTURERS OF

ESSON'S PATENT COMPENSATING GAS-METERS.

COWAN'S PATENT SIDE-VALVE GAS-METERS.

INTERNATIONAL EXHIBITION, 1862. CLASS X.

PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

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THROCKLEY,
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JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

HANCOCK'S INDIA-RUBBER GAS-TUBING.

All sizes, from ¼ in. to 4 in. diameter and upwards.
Also,
HORSE SINGEING APPARATUS, best make, with GAS-BURNERS, COMBS, and INDIA-RUBBER TUBING, all complete.
INDIA-RUBBER BAGS for GAS-MAINS.
WASHERS for GAS and STEAM JOINTS.
VALVES (pure solid Rubber) for STEAM-ENGINES.
PACKING (Elastic) for STEAM-ENGINES.
FLANGE TUBING, for excluding Draughts and Dust through WINDOWS, DOORS, and GLASS CASES.

Section.

Illustrated Price Lists on application.

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Established 1811.

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MANUFACTURERS OF
SUN BURNERS, GAS CHANDELIERS,
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And every Description of
GAS-FITTINGS,
Including
MEDIÆVAL FITTINGS for CHURCHES, &c.

Large Pattern Books complete, with Book of Prices, 7s. 6d.

D. GRANT & CO.,
GAS-METER MANUFACTURERS.

STATION-METERS ANY SIZE,
PHOTOMETERS, EXPERIMENTAL METERS, &c.

GAS-METER WORKS, CROSSCAUSEWAY,
EDINBURGH.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire-Bricks, and every description of Fire-Clay Good

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HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,
SUPPLY GAS AND WATER PIPES OF EVERY SIZE,
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description.
EXHAUSTERS.
LONDON OFFICE: 95, CANNON STREET.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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JAMES RUSSELL & SONS,
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GAS ENGINEERS,
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Of any extent at Home and Abroad,
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Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

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WOOD SIEVES FOR PURIFIERS.

These justly celebrated Sieves, with bevel bars and hard-wood side frames, have been extensively made by Messrs. Walker for over seven years, and their advantages and durability are fully established. Messrs. Walker make them in very large quantities, having mills and machinery specially laid out for them, producing them at the most moderate cost.

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CRYSTAL, BRONZED, & ORMOLU CHANDELIERS;
IMPROVED CRYSTAL STAR & SUN LIGHTS;
VESTIBULES,
IRON BARREL, COMPOSITION TUBING,
AND
GAS-FITTINGS OF EVERY DESCRIPTION.

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LONDON, BIRMINGHAM, AND PARIS.

Special Designs prepared in perfect accordance with architectural arrangements. Estimates furnished for the Lighting and Fitting up of Theatres, Music-Halls, and Public or Private Buildings with Gas.

GAS MOONS OF THE NEWEST DESIGNS.
The Patent Gas-Regulator & Purifier reduced to 6s. 6d. per Dozen.
Pattern Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1869, are now complete.

CITY SHOW-ROOMS & MANUFACTORY,
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TAR PURCHASED,
In Districts contiguous to the Advertiser's Works.

JOHN CLARKSON MAJOR,
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BRANCH WORKS AT
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Superior Quick-Drying Black Varnish for every description of Ironwork. Sold in barrels of about 36 gallons. Delivered free to any station in England at 1s. 2d. per gallon, cask included.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for regulating the pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS'S Patent Four-way Disc GAS-VALVE—ONE OF WHICH SERVES AS THREE ORDINARY VALVES—is the best Valve for gas-works.

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CATHELS'S Patent Ribbed Gas Main-PIPES cost but about 1d. to 2d. per yard (depending on the size) more than Plain Pipes, and ensure PERFECT GAS-TIGHT CONNEXIONS with the Service-Pipes.

Apply to Messrs. BROGS & SON, 37, Southampton Street, Strand, LONDON.

W. J. HOLLANDS,
IRON MERCHANT,
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SOCKET, FLANGE, HOT-WATER PIPES, AND ALL CONNEXIONS; RETORTS, HYDRAULIC MAIN, LAMP-COLUMNS, &c.; AND EVERY DESCRIPTION OF CASTINGS AND WROUGHT-IRON-WORK FOR GAS AND WATER-WORKS, STEAM, AND GENERAL PURPOSES.

N.B.—All goods kept in stock, and supplied at wholesale prices. Estimates given, and orders by post punctually attended to the same day.

JAMES OAKES and CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 26, WHARF ROAD,
CITY ROAD, LONDON,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water-Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.

CHARLES HORSLEY, Agent.

JAMES M'KELVIE,
CANNEL COAL MERCHANT,
HAYMARKET,
EDINBURGH.

Established 1840.

FIRE-CLAY GAS-RETORTS, &c., CANNEL AND STEAM COALS.

WILLIAM FRASER, Inverkeithing (owner of the Works at which Fire-clay Retorts were first made), having greatly enlarged his works, can supply retorts and other fire-clay goods to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

WILLIAM FRASER ships COWDENBEATH PARROT COALS at Charlestown and Burntisland at 12s. per ton; and HALBEATH STEAM COALS, on Navy List, at 8s. 6d. per ton.

LINTZ COLLIERY COMPANY.
FIRE-BRICK AND RETORT WORKS.

THE LINTZ COLLIERY COMPANY
Beg most respectfully to draw the attention of
GAS COMPANIES, FURNACE BUILDERS,
FIRE-BRICK DEALERS, & OTHERS,
To the superiority of their
FIRE-CLAY GOODS,
Where resistance to heat is of paramount importance, an ample guarantee of which is in the fact of their extensive use by most of the Iron Manufacturers in the North of England.

Not only is the quality of the Fire-Clay inferior to none in the northern Coal-field, but the greatest care is taken in selecting it. It is all hand picked, and well weathered before use.

All orders for
FIRE-CLAY RETORTS of any shape or size,
FIRE BRICKS, &c.,
Will meet with prompt attention.
LAYCOCK'S GARESFIELD COKE.

OFFICES: LINTZ COLLIERY, BURNOPFIELD, Co. DURHAM; AND QUAYSIDE, NEWCASTLE-ON-TYNE.

CANNEL COAL.—The West Yorkshire Iron and Coal Company, Limited, beg to draw the attention of Gas Companies to their Cannel, of which the following is the analysis made by W. Huggon, Esq., F.C.S.:—

Yield of gas per ton	10,296 cubic feet.
Illuminating power rather over	21 sperm candles.
Yield of coke per ton . . .	12 cwt.

The actual working, as reported by one of the largest gas companies in Yorkshire, gives results still more favourable, viz—

Yield of gas.	10,416 cubic feet.
Illuminating power . . .	21·89 sperm candles.
Coke	The same.

We add from the same source the capabilities of the common gas coal—

Yield of gas.	10,080 cubic feet.
Illuminating power . . .	14·41 sperm candles.
Yield of Coke	13 cwt.

COLLIERIES—WEST ARDSLEY, near LEEDS.

For further particulars, address to the Office of the Company, 15, York Place, LEEDS.

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We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles.*

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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OLD WEMYSS CANNEL COAL.—Yield of gas per ton, 12,896 cubic feet; illuminating power, 31·75 standard candles. Port of shipment, Wemyss.

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Beg leave to call the attention of Gas Companies to the superior quality of their Cannel for gas-making purposes.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

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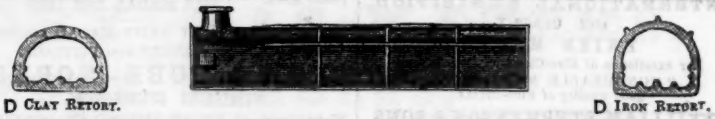

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Iron and Fire-Clay Retorts.
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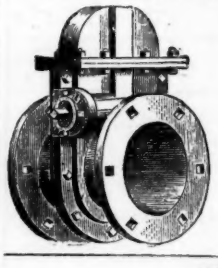

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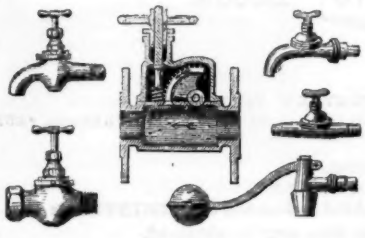

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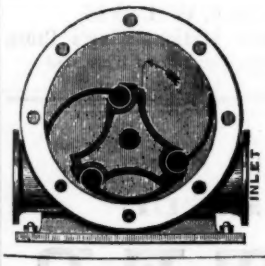

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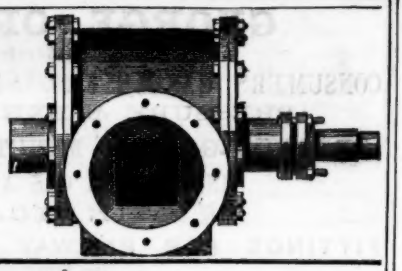

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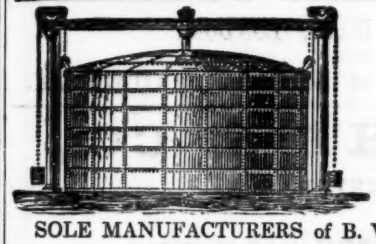

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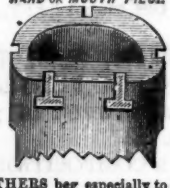

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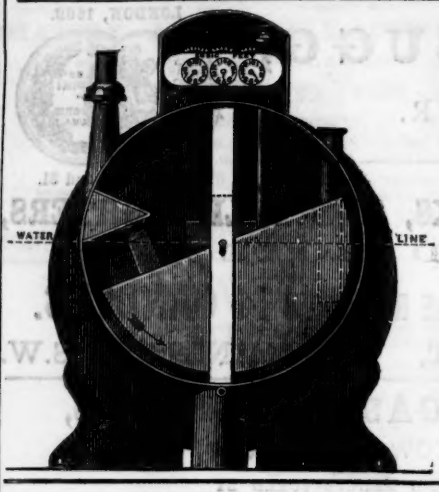

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Adjusted to any desired consumption.

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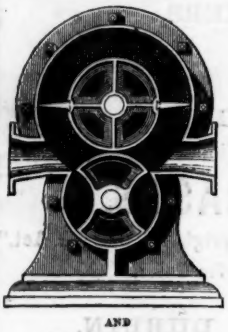

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